PREFACE

The American sheep industry could be on the verge of a major change in its role as a producer of meat and wool. High prices in world grain and petroleum markets are believed to favor the production of lamb relative to pork and beef, and to favor wool relative to synthetic fibers. Yet the sheep industry must also wrestle with a rapid and persistent decline in sheep production that has closed many marketing, processing, and distribution facilities.

Sheep producers remaining in the industry have become concerned with marketing because there are very few buyers of lambs and wool in most local areas, and alternative outlets are several miles away. In addition, marketing information is not as plentiful as it is for other livestock species and the accuracy of available information is often questionable.

In view of recent developments and the concerns of many sheep producers, the leadership of several national sheep associations requested that Farmer Cooperative Service develop and analyze alternative marketing-processing-distribution systems for sheep and lambs. The specific objectives of the study are: (1) describe the current economic situation of the industry; (2) describe several alternative marketing-processing-distribution systems; (3) compare advantages and disadvantages of alternative systems; and (4) recommend one or more alternative marketing-processing-distribution systems for U.S. sheep producers.

CONTENTS

SUMMARY AND RECOMMENDATIONS

If sheep producers desire to remain in the commercial sheep business and receive a fair return on their resources, they must take the initiative to increase production and to revise the production-assembly-processing-distribution system. This study primarily concerns the production-distribution system for lamb and mutton.

An analysis of that system shows that it is feasible for producers to form cooperatives for the purpose of implementing any of the following: (1) four regional teleauction networks, (2) a national bargaining association, (3) slaughter-processing cooperatives. Any of these alternatives could be effective in increasing net returns to producers and are worthy of serious consideration.

The current production-distribution system is relatively noncompetitive and inefficient and is continuing to move in that direction. Dwindling competition for sheep and lambs has been caused by the closing of several major packing plants. The closings have resulted in a reduction in the number of buyers competing for lambs in any given local area. The number of major plants in the United States has declined from 31 in 1970 to 20 in 1976 in response to declining sheep numbers. Even in 1970, the two largest packers in each Western and Midwestern State bought 50 to 75 percent of all lambs and in each Eastern and Southern State bought 75 to 100 percent. Because plants are currently operating at only 40 percent of capacity, more plants will close in the future and competition will be further restricted.

Dwindling efficiency of the lamb marketing system is largely the result of low volume and an obsolete handling system. Inefficiency is evidenced by an ever-widening farm-retail price spread for lamb that, since 1950-52, is growing 55 percent faster than the price spread for beef and 90 percent faster than the price spread for pork.

Because production is declining, most nonproducers do not have enough confidence
industry to make any new investments that would improve the system. And because
what is left over after all marketing, processing, and distribution costs are
d to gain the most by changing the system. Therefore, it behooves produc-
nitiative in redesigning the system.

'on can be implemented immediately, with a relatively small
... competition for lambs in local areas and thereby raise net prices to producers. While one teleauction could be used to sell all sheep and lambs in the United States, it would be more practical to consider four regional teleauctions. Two have been started already in the East and the Northwest. These two teleauctions should be expanded and two others added to cover the Midwest and the Southwest.

As current packers continue to close their plants and go out of business, even the

teleauction eventually will be of little value. In as little as 7 years, we could have as few as 10 plants owned by 7 firms scattered widely across the country. While a producer bargaining association could be started sooner, it will become a necessity if the number of packers becomes this low. Just as labor, in certain instances where there is little competition, has to bargain with management to get a fair price, producers are going to have to bargain with processors. A bargaining association would require only a moderate investment. It would require producers also to make production contracts with the association which, in turn, would contract with packers for specified deliveries of slaughter lambs.

Producers could engage also in processing. It could be done on a custom basis, or in a plant leased or owned by the producers. A new producer-owned processing plant would require an investment of $3.5 million to $4.8 million to kill and process 250,000 lambs a year. Producers must be willing to commit 40 to 50 percent of the investment to organize, build, and establish the cooperative in the marketplace. Producers also must commit their lambs to keep the plant operating at capacity. Processing is a major undertaking that could result in a few years of operating losses before it became profitable.

It is recommended that producers begin immediately to establish and support four regional teleauctions. Then as the number of packing plants declines to a lower level, producers should be prepared to implement regional bargaining associations or move directly into processing their own lambs. If the regional teleauction cooperatives are implemented now and become successful at handling large numbers of lambs, these cooperatives are more likely to be successful with bargaining or processing in the future than a cooperative that begins with the bargaining or processing function. Obtaining a sufficient and consistent supply of lambs will be the major obstacle to the success of either venture. Successful teleauctions will give producers the experience of working together and the confidence needed to make the greater necessary commitments for bargaining and processing.

All of the marketing and processing alternatives discussed in this report are expected to be feasible if properly organized and implemented. Producers should carefully consider the alternative that is best for them in their circumstances, given their willingness to commit capital and lambs and assume associated risks. Farmer Cooperative Service, your State Extension Service, other governmental agencies, and private consulting firms are available to provide assistance.

COOPERATIVE MARKETING ALTERNATIVES FOR SHEEP AND LAMB PRODUCERS

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ECONOMIC SITUATION

A wave of cautious optimism currently is gripping the American sheep industry as many extol the meat and fiber production efficiency of sheep. The optimism has arisen in the 1970's because of shortfalls in world grain production and the growing awareness of a world petroleum shortage. These developments have caused lamb production to compare favorably with pork and beef, which require more grain per pound of meat, and have caused wool to compare favorably with synthetic fibers that are derived from petroleum.

In concert with the improved economic outlook for sheep production, leading producers met in June 1975 to formulate a "Blueprint for Expansion of the American Sheep Industry." The blueprint establishes a goal of increasing the lamb meat production by 100 percent and wool production by 50 percent in 10 years (1985). To accomplish this goal, a number of subobjectives are presented in the areas of production, marketing, land use, predator control, labor, research, and education.[1]

Several comprehensive studies of the sheep industry have been published in the past 10 years.[2] The content of these studies of sheep production, marketing, processing, distribution, and consumption is summarized and updated below to provide an overview of the industry. The reader should consult the original studies when more detail is desired.

Production

In the total spectrum of U.S. agriculture, sheep production is a minor commodity, providing only ½ of 1 percent of cash receipts to producers. In contrast, cattle and calves generate 19.5 percent and hogs 8.8 percent.[3] In some major sheep-producing States like Utah and Wyoming, as much as 7 percent of cash receipts comes from sheep production through the sale of its products: sheep, lambs, and wool.

Location

Production is concentrated in States west of the Mississippi River (fig. 1). Texas is the largest producer with 21 percent of stock sheep.[4] Wyoming, California, South Dakota,

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[1]American Sheep Producers Council. Blueprint: Clearing Hurdles to Profit with Sheep. Denver, Colo., July 1976, pp. 4-5.

[2]Jack H. Armstrong, Henry V. Courtenay, and Max D. Judge. Sheep and Lamb Marketing, Slaughtering, Processing and Distribution. Cooperative Extension Service, Purdue University, Lafayette, Indiana.

Gerald Engelman, Everette Stoddard, and James Maetzold. The Lamb Industry: An Economic Study of Marketing Structure, Practices, and Problems. P&SA Research Report No. 2, Packer and Stockyards Administration, USDA, May 1973.

Kerry Gee and Richard Magleby. Characteristics of Sheep Production in the Western United States. Agr. Econ. Report No. 345, Economic Research Service, USDA, August 1976.

[3]Economic Research Service, USDA. State Farm Income Statistics. Supplement to Stat. Bul. 557, August 1976.

[4]"Stock sheep" includes lambs, yearlings, and older sheep, but excludes sheep and lambs on feed.

Utah, and New Mexico follow in order with from 10 percent to 5 percent of stock sheep. There was a moderate shift of production to the West Central Regions from 1920 to 1940 (table 1), but little shifting has occurred since 1940.

The predominant characteristic trend in the sheep industry has been the rapid decline in sheep production in all regions of the United States. The sheep population peaked in 1942 with 56.2 million head on farms and ranches (table 2). Since then, there has been a steady downward trend except for a plateau from 1950 to 1962. On January 1, 1976, only 13.4 million head were on farms and ranches. Despite a small increase in the average weight of sheep and lambs slaughtered, the pounds of meat produced also decreased (table 2).

Production Units

A recent study[5] of 17 Western States gives a considerable amount of information about sheep producers. While the study does not include all sheep producers in the United States, it includes those States where 80 percent of the stock sheep and 36 percent of the sheep producers are found (table 3). Western producers generally have more sheep than the average U.S. producer. As the number of sheep decreased, the number of producers also decreased, and the average Western producer remained about the same size with about 200 head each (table 3). Of the Western producers, 59 percent have fewer than 50 head, 35 percent have 50 to 999 head, and 6 percent have 1,000 or more head. Those 6 percent of the producers have 63 percent of the stock sheep (table 4).

Of the Western commercial producers (having 50 or more head) the majority of producers are between 41 and 60 years old, and 17 percent are more than 60 (table 5). About one-third of the commercial producers specializes in sheep production and two-thirds have sheep and cattle (table 6).

Sheep producers provide four different commodities: (1) spring lambs for slaughter (2) cull sheep for slaughter, (3) feeder lambs for further finishing, and (4) wool. Of total

Table 1—Distribution of stock sheep and lambs on farms, by region, January 1, selected years, 1920-76

Region[1]	1920	1930	1940	1950	1960	1970	1976
				Percent			
West Coast	14.4	14.1	11.0	9.7	9.7	10.0	11.1
Mountain	43.0	40.8	35.1	34.4	32.4	37.9	37.8
West North Central	10.6	11.4	15.2	14.0	22.1	17.7	15.6
West South Central	10.2	14.8	21.8	25.7	19.2	21.1	21.8
East North Central	11.6	10.2	9.6	8.4	9.4	8.3	8.4
East South Central	3.5	3.1	3.4	3.7	3.1	1.0	0.5
Northeast	3.5	2.5	1.6	1.5	1.7	1.7	2.0
Southeast	3.2	3.1	2.3	2.6	2.4	2.3	2.8

[1]West Coast - Oregon, Washington, California
Mountain - Idaho, Montana, Nevada, Arizona, New Mexico, Wyoming, Colorado, Utah
West North Central - North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Kansas, Missouri
West South Central - Texas, Oklahoma, Louisiana, Arkansas
East North Central - Wisconsin, Michigan, Illinois, Ohio
East South Central - Kentucky, Tennessee, Mississippi, Alabama
Northeast - Maine, New Hampshire, Vermont, New York, Rhode Island, Pennsylvania, New Jersey, Massachusetts, Connecticut
Southeast - Florida, North Carolina, South Carolina, Virginia, West Virginia, Delaware, Maryland, Georgia.

Source: Engelman, et. al, Lamb Industry, p.8; ERS, USDA, Livestock and Meat Statistics, Stat. Bul. 552, selected issues.

/. Sheep Production.

Table 2—Selected sheep inventory, production, and slaughter statistics, United States, 1940-76[1]

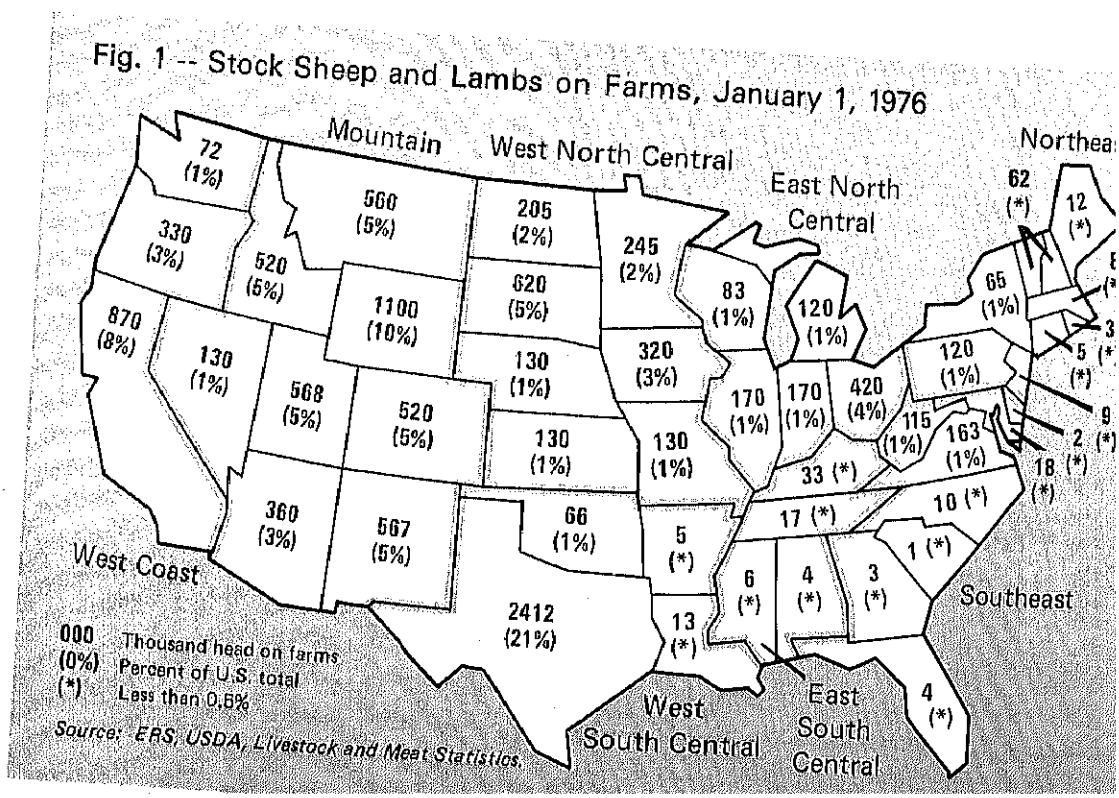
Year	All sheep	Breeding ewes	Lamb crop	On feed	Commerical sheep and lamb slaughter	Average live weight slaughtered	Lamb and mutton production 2/
			1,000 head				Million lbs.
1940	52,107	35,707	31,082	5,841	21,000	86	876
1941	53,920	36,419	32,610	6,479	21,727	88	923
1942	56,213	37,361	32,312	6,867	25,007	89	1,042
1943	55,150	37,303	30,924	6,954	26,497	90	1,104
1944	50,782	33,991	28,642	6,512	24,793	89	1,024
1945	46,520	31,280	27,042	6,911	24,068	94	1,054
1946	42,362	27,619	24,489	6,837	22,234	93	968
1947	37,498	24,790	21,858	5,693	18,207	93	799
1948	34,337	23,013	19,594	4,851	16,897	94	747
1949	30,943	20,976	18,298	4,003	13,376	93	603
1950	29,826	20,057	17,905	3,644	12,852	95	597
1951	30,633	20,446	17,978	3,382	11,075	97	521
1952	31,982	20,952	18,479	4,038	13,962	97	648
1953	31,900	21,648	19,497	4,307	15,967	95	729
1954	31,356	21,471	20,340	4,277	15,920	95	734
1955	31,582	21,321	20,214	4,445	16,215	96	758
1956	31,157	21,323	20,336	4,267	15,993	95	741
1957	30,654	20,976	19,810	4,306	14,957	96	707
1958	31,217	21,208	20,686	4,050	14,164	98	688
1959	32,606	21,832	21,120	4,498	15,180	99	738
1960	33,170	22,406	21,012	4,321	15,899	99	768
1961	32,725	22,199	20,782	4,405	17,190	98	832
1962	30,969	21,252	19,712	4,250	16,837	97	808
1963	29,176	20,028	18,516	4,054	15,822	98	770
1964	27,116	18,723	16,994	3,661	14,595	99	715
1965	25,127	17,502	16,312	3,284			
1966	24,734	16,850	15,881	3,278			
1967	23,953	16,230	15,017	3,276			
1968	22,223	15,290	14,444	3,115			
1969	21,350	14,707	13,723	2,995			
1970	20,423	13,923	13,439	2,990			
1971	19,686	13,609	12,930	2,740			
1972	18,710	12,901	12,537	2,875			
1973	17,724	12,116	11,513	2,872			
1974	16,394	11,106	10,508	2,650			
1975	14,512	10,062	9,820	2,091			
1976	13,346	9,334	NA	1,896			

[1] All sheep, breeding ewes, on feed data as of Janurary 1.
[2] Includes farm slaughter.
NA - not available.
Source: ERS, USDA, Livestock and Meat Statistics.

Table 3—Stock sheep and sheep producers, 17 Western States, selected years, 1940-7

Year	Stock sheep		Sheep producers[1]	
	Number	Percent of U.S. total	Number	Percent of U.S. total
	Million	Percent	Thousand	Percent
1940	34.3	74	NA	NA
1950	19.7	76	NA	NA
1960	21.5	75	115	34
1965	17.0	78	85.7	35
1970	13.7	79	64.7	36
1971	13.5	80	62.2	37
1972	12.5	79	60.1	37
1973	11.8	80	58.4	38
1974	10.9	80	51.5	35
1975	9.8	79	48.3	36
1976	9.2	80	NA	NA

[1] Assumed to be same as the number of farms and ranches with sheep.
NA —not available.
Source: Gee and Magleby, Sheep Production, p. 4.



sheep and lamb slaughter, about 7 percent is cull sheep, 33 percent milk-fed lambs, and 60 percent grain-fed lambs and yearlings.[6]

The number of cull sheep available for slaughter is directly proportional to the number of ewes on farms and probably does not vary much from one State to another. However, the disposition of lambs as spring lambs for slaughter or as feeder lambs is more variable among States, depending on length of pasture season, availability of supplemental feeds, traditions, and several other factors. Table 7 estimates the disposition of the 1975 lamb crop for 17 Western States. More than 75 percent of the lamb crop goes directly to slaughter in California and Arizona. In most of the Mountain States, about half goes directly to slaughter and half is fed. In the Plains States, about 75 percent goes to the feedlot. The major feeding States (in order from highest to lowest) are: Colorado, California, Texas, Wyoming, Arizona, and Nebraska. Four of the six States are major importers of feeder lambs. Wyoming and Texas are the exceptions and they are among the largest exporters of feeder lambs. The U.S. Department of Agriculture reports the number of lambs on feed as of January 1 each year in 26 States (fig. 2). About 82 percent of all lambs on feed are in the 17 Western States for which more detailed information has been estimated in this report. Considering a greater turnover rate for Western than Eastern feedlots, one would expect more than 82 percent of lambs to be fed throughout the year in Western States.

Seasonality of Production

Seasonality is another major characteristic of sheep production. In any one region most lambing occurs within a period of 2 or 3 months. Spring lambs are marketed for only 2 to 4 months and fed lambs for another 2 to 4 months (fig. 3). From a production viewpoint it is more efficient to schedule lambing each year to come just before the spring grass begins to grow so that ewes and lambs can obtain most of their feed from pasture, and then finish some of the slower lambs in feedlots. But from a marketing, processing, and distribution viewpoint, seasonal surges in production require extra capacity in facilities and extra manpower that must remain underemployed for most of the year. More of the added cost of seasonal production probably would be borne by producers if marketing and packing firms did not have considerable overcapacity. Overcapacity causes plants to operate while covering less than total costs as long as they can make some contribution to fixed costs.

Seasonal production within a State is illustrated by California and Texas in figure 4. Most spring lambs come to market in April through August. If it were not for a large number of fed lambs coming to slaughter in October through March, the problem of seasonal supply to packers would be much more severe.

A packer in a given region may directly modify the effect of seasonal production in that region by two means: (1) he may truck in lambs from other regions where the seasonal pattern is different; and (2) he may feed some lambs himself.

At the aggregate, or national, level there is relatively little seasonality in production (fig. 5). Spring lambs come to market largely from April through October with lambs fed by individuals and packers filling in the gap from November through March. Lambing begins in Texas, Arizona, and California in October (fig. 3) while most other areas do not begin until February or March.

The early spring lambs from the Southwest begin to come to slaughter in March and last until June or July. By May and June the Eastern and Cornbelt spring lambs begin to come to slaughter and continue through July and August. They are followed by

[6]Engelman, et.al. Lamb Industry, pp. 82-85; and ERS, USDA. Livestock and Meat Statistics. Stat. Bul. No. 522, July 1973 and annual supplements.

Table 4—Distribution of sheep producers and stock sheep according to size of operation, 17 Western States, preliminary 1974[1]

Type of operation and number of sheep	Sheep producers		Stock sheep	
	Number	Percent of region	Number	Percent of region
	Thousand	Percent	Million	Percent
Noncommercial:				
Under 50 head	30.4	59.0	0.8	7.3
Commercial farm flock:				
50-299	14.4	27.9	1.4	13.0
300-999	3.8	7.4	1.8	16.7
Subtotal 50-999	18.2	35.3	3.2	29.7
Commercial large-scale:				
1,000-2,499	2.1	4.1	3.5	32.0
2,500 and over	0.8	1.6	3.4	31.0
Subtotal 1,000 and over	2.9	5.7	6.9	63.0
Total West	51.5	100.0	10.9	100.0
Total commercial (50 and over)	21.1	41.0	10.1	92.7

[1]Preliminary estimates based on sample data.
Source: Gee and Magleby, Sheep Production, p. 8.

Table 5—Age distribution of sheep producers, 17 Western States, 1974

Age of producer	Percent of producers
30 and under	17
31-40	15
41-50	26
51-60	25
61-70	13
71 and over	4
Total	100

Source: Gee and Magleby, Sheep Production, p. 11.

Table 6—Diversification of sheep producers, 17 Western States, 1974

Type of enterprise	Percent of producers
Sheep only	31
Sheep and beef cattle only	56
Sheep and goats only	2
Sheep, goats, and cattle	11
Total	100

Source: Gee and Magleby, Sheep Production, p. 13.

Table 7—Disposition of sheep and lambs, 17 Western States, 1975

State/Region	Disposition of lamb crop[1]				Lamb feeding		Available for slaughter			Actual slaughter[6]	Exports of slaughter animals[7]
	Replacements	Spring lambs	Feeder lambs	Total	Number fed[2]	No. exported[3]	Sheep[4]	Lambs[5]	Total		
	1,000 head										
Washington	5.7	23.0	18.3	47.0	25.5	-7.2	3.6	48.5	52.1	233.5	-181.4
Oregon	35.8	130.6	89.6	256.0	102.0	-12.4	16.8	232.6	249.4	42.6	206.8
California	25.7	495.1	122.2	643.0	418.0	-295.8	45.0	913.1	958.1	1,477.0	-518.9
West Coast Region	67.2	648.7	230.1	946.0	545.5	-315.4	65.4	1,194.2	1,259.6	1,753.1	-493.5
Idaho	60.1	245.5	195.4	501.0	84.0	111.4	28.8	329.5	358.3	9.4	348.9
Montana	48.7	100.8	175.5	325.0	117.0	58.5	28.2	217.8	246.0	2.6	243.4
Wyoming	92.7	244.9	324.4	662.0	208.0	116.4	55.1	452.9	508.0	2.6	505.4
Nevada	11.8	44.6	34.6	91.0	31.2	3.4	6.7	75.8	82.5	1.8	80.7
Utah	55.1	207.8	161.1	424.0	88.8	72.3	32.1	296.6	328.7	142.5	186.2
Colorado	48.3	185.4	169.3	403.0	1,056.0	-886.7	27.1	1,241.4	1,268.5	1,513.0	-244.5
Arizona	4.0	164.3	29.7	198.0	195.0	-165.3	16.2	359.3	375.5	1.7	373.8
New Mexico	81.3	29.2	214.5	325.0	42.0	172.5	25.3	71.2	96.5	95.3	1.2
Mountain Region	402.0	1,222.5	1,304.5	2,929.0	1,822.0	-517.5	219.5	3,044.5	3,264.0	1,768.9	1,495.1
North Dakota	26.6	24.6	153.8	205.0	132.0	21.8	11.8	156.6	168.4	1.3	167.1
South Dakota	88.0	82.2	416.8	587.0	147.4	269.4	35.5	229.6	265.1	330.6	-65.5
Nebraska	15.6	14.4	90.0	120.0	187.0	-97.0	8.1	201.4	209.5	439.7	-230.2
Kansas	16.8	15.5	96.7	129.0	68.0	28.7	7.8	83.5	91.3	6.4	84.9
West N. Cen. Region[8]	147.0	136.7	757.3	1,041.0	534.4	222.9	63.2	671.1	734.3	778.0	-43.7
Oklahoma	6.6	6.1	38.3	51.0	34.5	3.8	3.2	40.6	43.8	1.3	42.5
Texas	397.5	143.1	1,049.4	1,590.0	306.0	743.4	110.8	449.1	559.9	1,409.5	-849.6
West S. Cen. Region[8]	404.1	149.2	1,087.7	1,641.0	340.5	747.2	114.0	489.7	603.7	1,410.8	-807.1
Total 17 Western States	1,020.3	2,157.1	3,379.6	6,557.0	3,242.4	137.2	462.1	5,399.5	5,861.6	5,710.8	150.8

[1]Based on percentages derived from Gee and Magleby, Sheep Production, using total lamb crop less lamb deaths from ERS, USDA, Livestock and Meat Statistics.
[2]Lambs on feed, January 1, from Livestock and Meat Statistics times turnover rate derived of ratio spring lamb/fed lamb marketings from Engelman, et al Lamb Industry.
[3]Feeder lambs minus lambs fed. Negative numbers indicate net imports.
[4]Based on national average of 5.76 ewes slaughtered per 100 ewes on farms January 1.
[5]Spring lambs plus fed lambs.
[6]Commercial slaughter, Livestock and Meat Statistics.
[7]Total available minus actual slaughter. Negative numbers indicate net imports.
[8]Partial totals for the region.

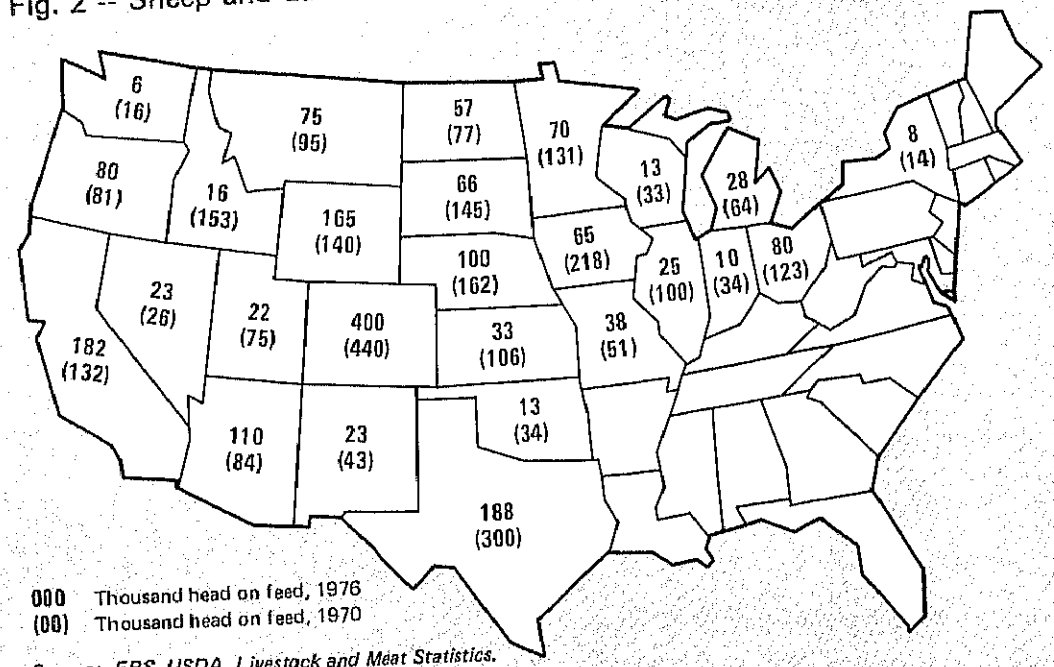
the Rocky Mountain spring lambs in August through October. Many of the mountain lambs flow west, south, and east to packers in nearby regions. These lambs are weaned as the mountain pastures close. Only about half of the lambs are ready for immediate slaughter. The other half flow out of the region to be fed on lower elevation pastures and on grain. The Mountain Region supplies the bulk of feeder lambs fed for late fall and winter slaughter.

Packer Feeding

A large number of lambs are placed on feed by packers to assure a sufficient supply for slaugher in the off-season. In 1975, 9 packers fed 1 million lambs, almost 15 percent of all lambs slaughtered (table 8). Of the estimated 4 million lambs fed in 1975, packers fed about one-third. Almost half of these packer-fed lambs were fed in Colorado and another 12 percent were fed in Texas (table 9). Packers also contract thousands of lambs for future delivery. Usually in the spring, packers buy entire bands of lambs for summer and fall delivery.

In addition to lambs placed on feed or contracted in advance by packers, thousands of other lambs are fed by owners, officers, and other packer-associated interests. The net result of all advanced packer purchases is a reduction in the effectiveness of traditional competitive markets for slaughter lambs.

Fig. 2 -- Sheep and Lambs on Feed, [illegible] ary 1, 1970 and 1976



Future

The big question concerning the future of the entire sheep industry is: When will the downward trend in sheep production level off and when, if ever, will it turn up? Simple, traditional methods of projecting a trend are not adequate. It is highly unlikely, for example, that the sheep population will decline another 14 million head from 1976 to 1995 as it did the previous 20 years. If it does, there will be none left. It is also unlikely that a strong downward trend will be suddenly reversed.

The future of sheep production seems to depend on a number of interrelated factors such as: (1) profitability, (2) competition from other enterprises, (3) predator control, (4) labor supply, (5) land use policies, and (6) general level of confidence in the industry. These are a complicated group of factors to analyze. From a general review of the situation, it seems logical to assume that production will continue to decline for at least a few more years.

If lamb meat production is going to be increased by 100 percent by 1985, as proposed in the "Blueprint for Expansion of the American Sheep Industry," there must be an increase in efficiency by producing more lambs per ewe and by increasing the market weight of lambs. Together with some increase in the number of ewes, lamb meat production theoretically could be increased rapidly. The major roadblock will be persuading producers to increase efficiency and hold back more ewe lambs for flock expansion.

Increasing the number of lambs marketed per ewe will require a combination of factors including the use of breeding stock that will produce more lambs per ewe and the reduction of lamb and ewe deaths. While a few breeds can produce 4 or more lambs per ewe a year and many producers currently produce 1.5 to 2.0 lambs per ewe, the national average for lambs saved per ewe (after deducting lamb deaths) was only 0.84 in 1975. This

Fig. 3 — Lambing and Marketing Schedule

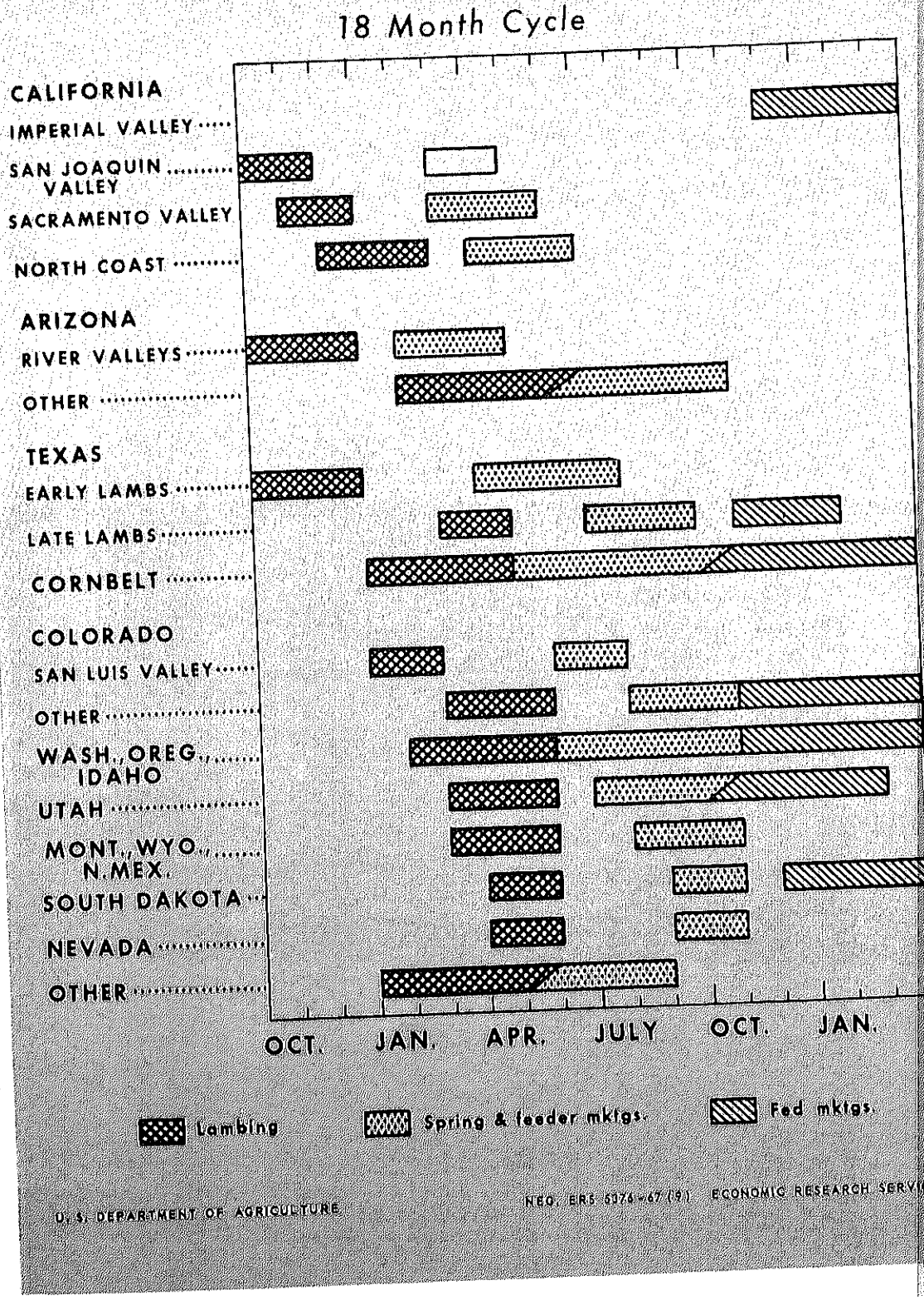
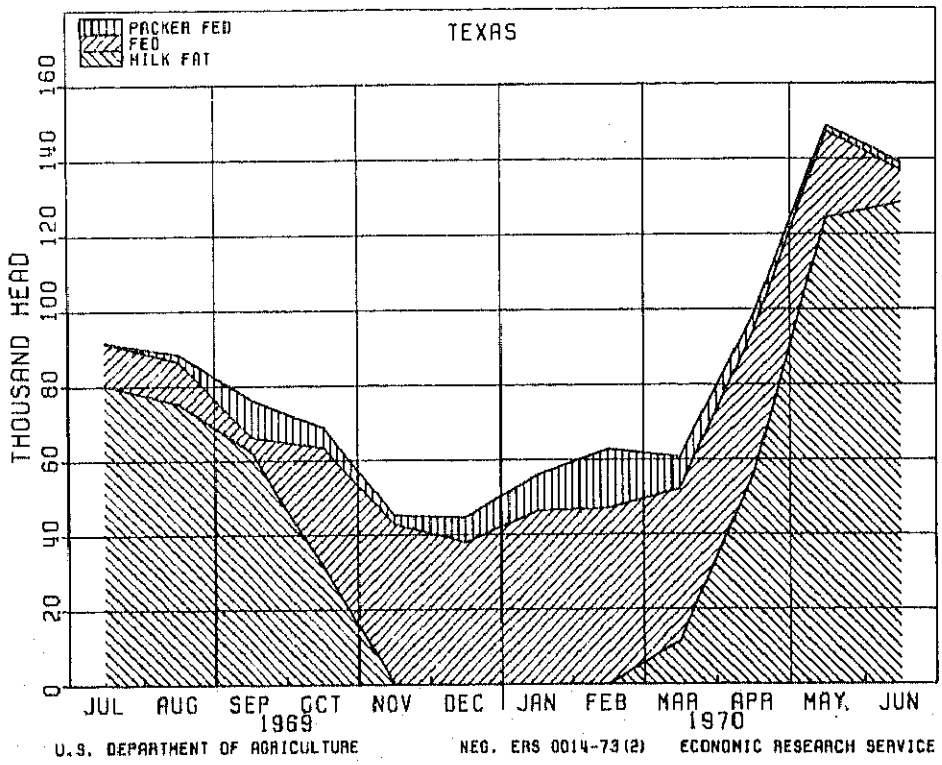


Fig. 4 — Slaughter Lamb Marketings



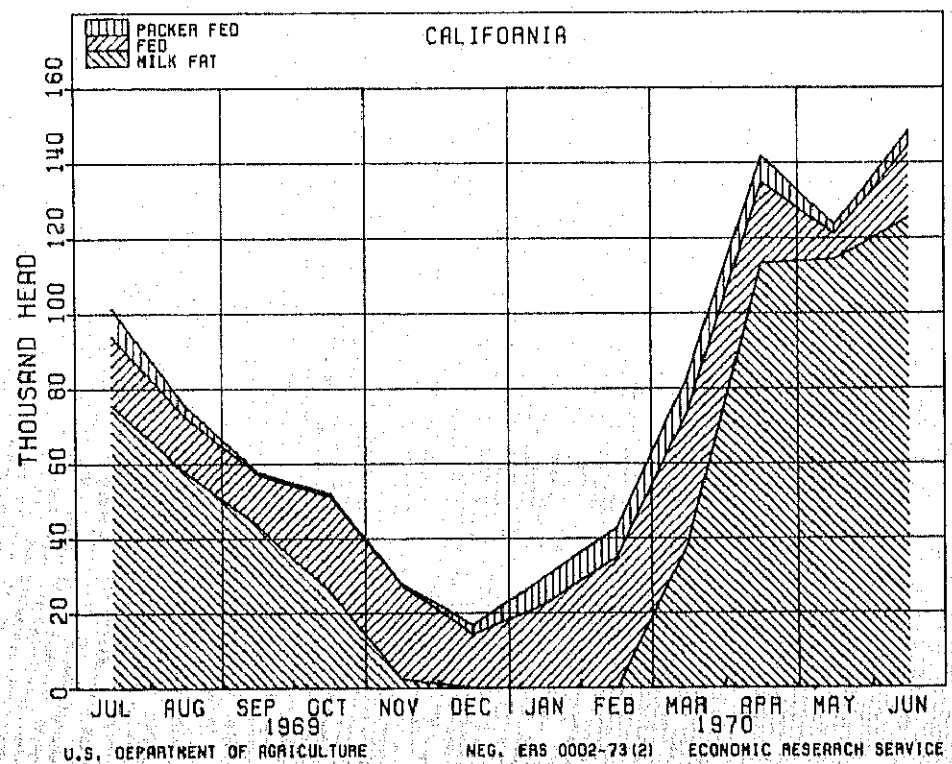
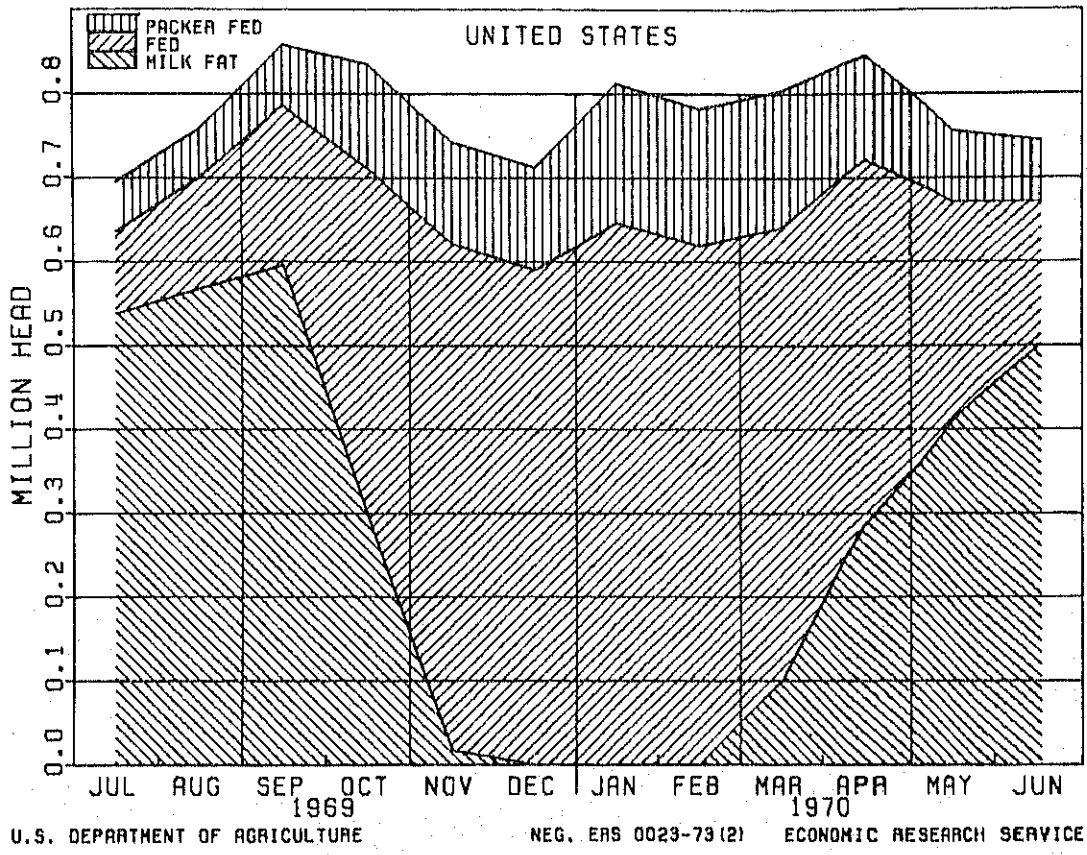


Fig. 5—Slaughter Lamb Marketings



average could be gradually raised to around 1.25 by 1985. More intensive management, confinement production, and improved predator control could reduce lamb and ewe deaths. The net result would be more lambs marketed per ewe.

The lambs could also be fed to heavier weights, with a wider adoption of genetic material already available and greater acceptance of heavier, meatier lambs by packers. In 1975, the average lamb slaughtered weighed 104 pounds. By 1985, weights could be increased to 125 pounds.

The blueprint is not specific on subgoals that must be achieved each year to arrive at its 10-year goal in 1985. A year-by-year illustration is included as part of this report. In January 1975, 10.6 million ewes were on farms. They produced 9.8 million lambs, of which 1.3 million died, leaving 8.5 million lambs saved (lambs equal to 84 percent of ewes) for slaughter and flock replacement. About 10 percent of the ewes were replaced, and lambs equal to 74 percent of ewes went to slaughter. These lambs produced 776 million pounds of live lambs for slaughter (table 10).

For 1985, the blueprint calls for 50 percent more ewes producing 125-pound lambs for a total live weight that is 100 percent greater than in 1975. By assuming a gradual increase in lambs saved per ewe and in lamb weights at slaughter, total replacements must be increased rapidly to 30 percent of the ewe flock. To reverse the downward trend and double lamb production, the industry will have to achieve an 8 percent annual growth rate in ewe population in the last 7 years of 10-year plan. There will be a substantial drop

Table 8—Lambs fed by or for meatpackers compared with U.S. lamb and yearling slaughter, 1954-75

Year	Lamb and yearling slaughter[1]	Packer feeding[2]		
		No. feeding firms	No. head fed	Percent slaughte
	1,000 head		1,000 head	
1954	13,265	20	1,248.3	9.4
1955	13,519	26	533.1	3.9
1956	13,314	16	723.7	5.4
1957	12,491	19	667.4	5.3
1958	11,678	23	712.6	6.1
1959	12,808	24	701.6	5.5
1960	13,159	24	825.8	6.3
1961	14,169	27	605.7	4.3
1962	13,762	26	550.7	4.0
1963	13,171	29	642.2	4.9
1964	12,230	29	867.1	7.1
1965	11,064	20	825.9	7.5
1966	10,795	17	1,295.5	12.0
1967	10,735	12	925.6	8.6
1968	10,198	16	952.3	9.3
1969	9,340	15	1,272.0	13.6
1970	9,298	13	1,233.5	13.3
1971	9,437	12	919.2	9.7
1972	9,227	10	1,403.2	15.2
1973	8,426	9	1,544.9	18.3
1974	7,987	9	1,329.2	16.6
1975	6,993	7	1,014.8	14.5

[1]Federally inspected lamb and yearling slaughter, ERS, USDA, Livestock and Meat Statistics.
[2]Feeding by packer-associated interests is not included. (About 100,000 head of sheep and lambs were fed by packer-associated interests in 1965.)
Source: Packers and Stockyards Administration, USDA. Resume, December 24, 1976, p. 31.

Table 9—Sheep and lambs fed by or for meatpackers and percentages of total fed, by States, 1973-75[1]

State[2]	1973		1974		1975	
	1,000 head	Percent	1,000 head	Percent	1,000 head	Percent
Colorado	796.7	51.6	638.6	48.0	520.4	51.3
Texas	192.2	12.4	200.7	15.1	126.0	12.4
California	63.1	4.1	53.1	4.0	97.2	9.6
Nevada	140.2	9.1	92.7	7.0	89.6	8.8
Nebraska	56.3	3.6	64.1	4.8	83.0	8.2
New Mexico	47.1	3.0	29.7	2.2	28.5	2.8
Idaho	6.2	0.4	2.9	0.2	26.9	2.6
Utah	15.5	1.0	88.9	6.7	17.5	1.7
Wyoming	62.6	4.0	53.3	4.0	7.7	.8
Iowa	41.6	2.7	26.8	2.0	5.8	.6
	30.2	2.0	24.7	1.9	4.1	.4
a	58.1	3.8	23.5	1.8	1.8	.2
		1.2	19.9	1.5	—	—
		98.9	1,318.9	99.2	1,008.5	99.4
		1.1	10.3	0.8	6.3	0.6
Total	1,544.9	100.0	1,329.2	100.0	1,014.8	100.0

[1]Separate feeding activities by owners, officers, or employees of meat packers or nonreporting subsidiaries or affiliates are not included. cluded.
[2]Ranked according to 1975 reports.
[3]Includes States where fewer than 5,000 head were fed, and also where the feedlot was not reported. (The report form does not require name and location of feedlot where fewer than 1,000 head were fed.)
Source: Packers and Stockyards Administration, USDA. Resume. December 24, 1976, p. 32.

in the number of lambs slaughtered by 1978, and it will not recover to the 1975 level until 1980-1981.

A second illustration is given to show the effect of doubling lamb production with more efficient sheep production (table 11). This illustration is based on increasing lambs saved per ewe to 1.25 by 1985, and keeping the increase in slaughter weight the same as in the first illustration (table 10).

The second illustration is given because the key to making sheep profitable is the number of lambs marketed per ewe. Maintaining a ewe is a major share of the production cost. Having prolific ewes and saving their lambs is essential for profitable sheep production. Production budgets show reasonable returns to sheep if 1.25 lambs per ewe can be sold or put into additional production. In the second example, the ewe flock is increased to only 128 percent of the 1975 level instead of 151 percent as in the first illustration, and the number of lambs slaughtered drops to a low of only 85 percent of 1975 instead of 74 percent.

The drop in numbers of lambs for slaughter should not be taken lightly. If the industry should decide to turn the downward production trend around in 1975 (or any other year), lambs available for slaughter would decline very rapidly as the ewe lambs were withheld to increase the size of the breeding flock. The 18 to 29 percent reduction in lambs for slaughter, (tables 10 and 11) means 1.4 to 2.1 million fewer lambs in 1978 than in 1975. Many of the 20 plants killing more than 100,000 head per year probably could not remain in business during the cutback and would not reopen in 1981 when production returned to its 1975 level. Most plants are already operating well below capacity. As many as 2 million fewer lambs could trigger the closing decision in at least five of these plants. Note the much less severe cutback in lambs for slaughter if more efficient production accompanies the decision to increase production (table 11).

Competition from cow-calf production is another factor affecting sheep expansion. Many producers have the opportunity to raise either cattle or sheep, and vary the ratio according to their expected outlook. The relative profitability of sheep and cattle varies with the feeder cattle price cycle in relation to the almost steady rise in lamb prices caused by the continuous decline in production since the early 1960's. In 1964 and 1965, for example, when feeder cattle prices were at their cyclical low, sheep production made greater returns to capital than feeder cattle production. Sheep continued to return more until 1971 when feeder cattle prices were rising rapidly (table 12). During 1964-70, sheep production made a greater return to capital than cattle. During this time period the lamb/steer price ratio was 0.75 or above. While data on the relative returns to capital are not readily available for the years after 1972, the price ratios for 1974 and 1975 indicate a greater profitability for sheep than cattle (table 12). Sheep are likely to be favored for at least a few more years while the cattle cycle gets turned around. The large increase in lamb prices to more than $60 per hundredweight in April and May of 1976 led many to believe that rapid expansion would begin soon. However, many producers may have sent good replacement ewes to slaughter if they believed prices would not return to $60 in the next year or two.

In planning ahead for a rapid increase in production, producers must also consider how to shut it off once their goal is reached. A geometric expansion of sheep production to double output within the next 10 years is bound to have an adverse effect on lamb prices, but the effect will be small if demand can be effectively stimulated. There is, no doubt, a lot of "latent" demand for lamb that could be stimulated if the product only were made available. Consumption per capita was only 2.0 pounds (carcass) in 1975, whereas in 1960 it was 5.2 pounds. In many parts of the United States, consumers are

Table 10—An illustration of how to double lamb production in 10 years by increasing ewe flock by 50 percent (column 3)

Year	Ewes on farms	Ewes as % of 1975	Lambs as % of ewes			Lambs marketed		Pounds marketed		
			Saved	Replacement[1]	Marketed	Total	As % of 1975	Average	Total	As % of 1975
	1,000					1,000			1,000	
1975[2]	10,062	100	84	10	74	7,460	100	104	775,840	100
1976	9,156	91	86	16	70	6,409	86	105	672,966	87
1977	8,699	87	88	23	65	5,654	76	106	599,361	77
1978	8,873	88	90	30	60	5,324	71	108	574,970	74
1979	9,583	95	93	30	63	6,037	81	110	664,102	86
1980	10,349	103	96	30	66	6,830	92	112	764,998	99
1981	11,177	111	99	30	69	7,712	103	114	879,183	113
1982	12,072	120	102	30	72	8,692	116	116	1,008,253	130
1983	13,037	130	105	30	75	9,778	131	119	1,163,552	150
1984	14,080	140	108	30	78	10,982	147	122	1,339,853	173
1985	15,207	151	112	30	82	12,470	167	125	1,558,718	201
1986	16,423	163	116	28	88	14,452	194	128	1,849,887	238
1987	17,409	173	120	25	95	16,539	222	130	2,150,012	277
1988	17,931	178	124	22	102	18,290	245	132	2,414,230	311

[1]Replacement includes 17% ewe retirement, 4% ewe death loss, 1% ram replacement (1 ram per 100 ewes), up to 8% growth in ewe flock.
[2]Actual data. Remaining data based on assumptions about lambs saved, replacement rate, average weight.

Table 11—An illustration of how to double lamb production in 10 years by increasing lambs saved per ewe to 125 percent (column 4)

Year	Ewes on farms	Ewes as % of 1975	Lambs as % of ewes			Lambs marketed		Pounds marketed		
			Saved	Replacement[1]	Marketed	Total	As % of 1975	Average	Total	As % of 1975
	1,000					1,000			1,000	
1975[2]	10,062	100	84	10	74	7,460	100	104	775,840	100
1976	9,156	91	88	16	72	6,592	88	105	692,194	89
1977	8,699	87	92	20	72	6,263	84	106	663,908	86
1978	8,699	87	96	26	70	6,089	82	108	657,644	85
1979	9,047	90	100	28	72	6,514	87	110	716,522	92
1980	9,590	95	104	28	76	7,288	98	112	816,301	105
1981	10,165	101	108	28	80	8,132	109	114	927,048	120
1982	10,775	107	112	28	84	9,051	121	116	1,049,916	135
1983	11,422	114	116	28	88	10,051	135	119	1,196,112	154
1984	12,107	120	120	28	92	11,138	149	122	1,358,890	175
1985	12,833	128	125	28	97	12,448	167	125	1,556,043	201
1986	13,602	135	130	26	104	14,146	190	128	1,810,698	233
1987	14,147	141	135	24	111	15,703	211	130	2,041,412	263
1988	14,430	143	137	22	115	16,595	223	132	2,190,474	282

[1]Replacement includes 17% ewe retirement, 4% ewe death loss, 1% ram replacement (1 ram per 100 ewes), up to 6% growth in ewe flock.
[2]Actual data. Remaining data based on assumptions about lambs saved, replacement rate, average weight.

Table 12—Lamb/steer price relationships, 1960-75

Year	Slaughter lambs, average price, Omaha	Feeder steers, Good/Choice price, Kansas City	Price ratio: lamb/steers	Return to capital ratio: sheep/cattle
	$/cwt.	$/cwt.		
1960	18.97	27.88	.68	.32
1961	16.45	27.77	.59	.09
1962	19.03	27.69	.69	.87
1963	19.47	27.02	.72	.27
1964	20.91	22.57	.93	1.60
1965	23.93	23.70	1.01	2.24
1966	24.07	28.38	.85	1.30
1967	23.60	28.00	.84	1.94
1968	26.58	29.10	.91	1.83
1969	28.53	32.89	.87	1.86
1970	27.43	36.73	.75	1.30
1971	27.43	36.84	.75	.91
1972	30.13	46.54	.65	NA
1973	36.69	59.73	.61	NA
1974	39.76	39.23	1.01	NA
1975	44.42	29.48	1.51	NA

NA not available.
Source: ERS, USDA, Livestock and Meat Statistics; Wylie D. Goodsell and Macie Belfield, Costs and Returns, Migratory-Sheep Ranches, Utah, Nevada, 1972. ERS 523, ERS, USDA, June 1973, p. 15.

unable to buy it any more, and they must substitute beef and pork for lamb.

However, we cannot continue to double production without seriously affecting price. Tables 10 and 11 are extended to 1988 to show the effects of gearing down to a more stable level of production after 1985. Replacements are cut down over a 3-year period to 22 percent, which is assumed to be the rate to maintain a constant number of ewes in production. The cutback immediately releases more lambs for slaughter. Whereas production was doubled in 10 years the first time, it will grow another 40 to 50 percent in just 3 years even if there is a leveling off of production. Note that the leveling off occurs with less extra production in the more efficient illustration (table 11) than in the illustration using more ewes (table 10).

Marketing

Producers and packers use a number of methods to move sheep and lambs from farms and ranches to slaughterhouses. The most common channel for lambs, especially in the Western States, is direct to a packer buyer or order buyer. Packers and Stockyards Administration data do not distinguish direct sales to packer buyers and order buyers from sales to country dealers. In 1974, direct sales and country dealers' sales accounted for 75 percent of packers' procurement for the United States as a whole and 95 percent for packers in the Mountain and Pacific Regions (table 13). Auctions generally provided 14 percent, but in the North Atlantic and South Atlantic Regions, auctions provided 57 and 90 percent, respectively. Terminal markets provided packers with 12 percent of pur-

chases. Terminals were particularly important to packers in the South Central Region and moderately important in the East North Central Region.

The trend in marketing channels has been away from terminal markets to direct sales and country dealers. In 1930, terminals handled 85 percent of sheep and lambs and all other methods handled 15 percent, whereas in 1974, terminals handled 12 percent and direct and country dealers, 75 percent. Auctions have maintained about 10 to 15 percent of packer purchases since the separate data series began in 1960 (table 14).

The special survey of Western sheep producers gives additional insight into the marketing patterns of "commercial" (50 or more head of sheep) producers. These producers owned 92.7 percent of the stock sheep in 17 Western States or 74.2 percent of U.S. stock sheep population. Packer buyers and order buyers bought 43 and 32 percent, respectively; and dealers and auction markets bought 10 percent each (table 15).

Much less is known about the marketing of feeder lambs. In the Mountain Region, producers often sell their entire band to one buyer. The buyer sorts the finished lambs from feeder lambs and ships each to its appropriate destination. A packer buyer may retain the feeder lambs for feeding or sell them to a third party. Order buyers may fill feedlot orders for feeder lambs at the same time they fill packer orders for slaughter lambs. As a rough guide, feeder lambs, as well as cull sheep, are thought to go through the same channels as slaughter lambs.

The declining sheep population has resulted in the closing of many slaughtering plants. The declining sheep population also means a decreasing concentration of sheep production, making it more difficult for existing packers to justify the employment of many buyers. The net result is few buyers available to bid on an individual producer's sheep and lambs. Table 16 shows that the two largest U.S. buyers bought 37 percent of all lambs slaughtered, but the two largest buyers in several individual States bought more than 65 percent of the slaughter lambs.

Gee and Magleby have summed the situation as follows:[7]

"The limited number of buyers bidding on any individual producer's lambs has been a continual source of concern to sheepmen. The average for 1974 was 2.1 buyers (17 Western States), with little difference among production subregions or size of operation categories. In an attempt to increase the number of bidders and to exercise more marketing clout, producers recently have begun forming lamb marketing cooperatives. Interest in the organizations is expanding, with many producers convinced that such pools will help them gain a higher percentage of the retail price. The intention of many producers is that these cooperatives grow into a series of regional cooperatives with overall coordination under one organization."

Role of Cooperatives

Cooperative involvement in sheep and lamb marketing has been moderate. In 1975, cooperatives handled about 32 percent of sheep and lambs sold at terminal markets and 11 percent sold at auction markets. However, terminals and auctions accounted for only 11 and 13 percent, respectively, of all packer purchases of sheep and lambs. Seventy-five percent were sold direct and by dealers (table 14). Because cooperatives do not slaughter lambs, they did not handle any direct producer-packer sales. Cooperatives did sell some sheep and lambs on a dealer basis. Most lamb pools are sold this way. But cooperative lamb pools are relatively unimportant, accounting for only 3 percent of sales in 17 West-

[7]Gee and Magleby. Sheep Production, pp. 21-22.

Table 13—Sheep and lambs purchased by packers through major market channels, by region, 1974

Region[1] (packer location)	Terminal	Auction	Direct or country deale
		Percent	
North Atlantic	16.5	56.6	26.9
East North Central	39.9	44.5	15.7
West North Central	19.4	3.6	77.0
South Atlantic	2.0	90.0	8.0
South Central	70.2	24.4	5.5
Southern Plains	2.9	15.0	82.1
Mountain	0.0	2.2	97.8
Pacific	2.2	4.9	92.9
48 States	11.5	13.5	75.1

[1]See footnote to table 1 for list of States in each region.
Source: P&SA, USDA. Resume. pp. 22-23

Table 14—Sheep and lambs purchased by packers through major market channels, United States, 1923-74

Year	Terminal	Auction	Direct or country dealer[1]
		Percent	
FI series:			
1923	85.4		14.6
1930	84.7		15.3
1940	63.8		36.2
1950	57.4		42.6
P&SA series:			
1960	35.4	10.6	54.0
1961	36.8	10.9	52.3
1962	35.4	15.2	49.4
1963	30.0	14.0	56.0
1964	28.6	13.7	57.7
1965	25.5	12.1	62.4
1966	21.9	13.5	64.6
1967	19.0	16.2	64.8
1968	18.6	15.0	66.4
1969	16.1	13.1	70.8
1970	15.1	12.4	72.5
1971	13.6	12.3	74.0
1972	13.7	12.0	74.3
1973	12.3	14.7	72.9
1974	11.5	13.5	75.1
1975	10.0	15.6	74.4

[1]Includes auctions for 1923-1950. Auction market purchases were not significant until about 1940.
Source: Engelman, et. al. Lamb Industry, p. 17; Packers and Stockyards Administration, USDA, Resume. Statistical Issues, December 1973-1976.

ern States (table 15). Some cooperatives in the Corn Belt have acted as an order buyer to obtain feeder lambs and breeding ewes for their members.

The use of teleauction selling is a much more recent cooperative development. The first was established by Eastern Lamb Producers Cooperative in the Virginia-West Virginia area in 1971. Another was initiated by PNW Livestock Producers Marketing Cooperative in the Oregon-Idaho area in 1974. In 1975, the two teleauctions sold about 55,000 sheep and lambs for slaughter and 10,000 feeder lambs.

Producers in both areas initiated the teleauction sales because they were quite concerned about the lack of competition for their sheep and lambs. The teleauction is a means of increasing buyer access to the lambs by conducting an auction over a conference telephone call. While many prospective buyers cannot afford to travel to a given area to buy lambs, they can "afford" to participate in a telephone sale where producers pay the telephone bill.

Before the Eastern Lamb Producers Cooperative was started in 1971, 89 percent of the Virginia-West Virginia lambs were bought by two packers (table 16) in the greater metropolitan New York area. A large number of these lambs are now being sold by teleauction to buyers in Illinois, Michigan, and the Province of Ontario. Many of the lambs going to Illinois and Michigan probably are shipped East again for consumption.

While there are relatively more packers in the Western States than Eastern States, Western producers still do not have many bids on their lambs. Two packers bought 91 percent of the lambs in Oregon and 55 percent of the lambs in Idaho in 1970 (table 16). The PNW teleauction has helped to change that situation. At least in the West, there are still enough packers that most lambs move toward the direction of consumption as they go to slaughter.

The net result of the teleauction has been advantageous to producers. Lamb prices to cooperative members in the Virginia-West Virginia area were raised about $2.50 per hundredweight in comparison with other prices paid in the United States.[8] Cooperative members in the Oregon-Idaho area used to receive prices from local auctions, but the teleauction price is as much as $4 per hundredweight above auction prices and about equal to prices received in large range sales.

Another recent cooperative development in Idaho is the establishment of the Rocky Mountain Sheep Marketing Company in 1975. In the spring of each year Rocky Mountain seeks forward contracts for its members for mid- to late-summer delivery. Both auction and private negotiation have been used to establish the contract price.

While PNW was largely organized to serve the needs of small farm flock producers, a few large range producers also are members. Rocky Mountain was organized to serve the marketing needs of large range producers. The lack of buyers makes it beneficial even for large volume producers to enter cooperative marketing programs.

Slaughter and Processing

of Plants

er has declined in direct response to the decline in production. As a result, many packing plants have closed. The lack of competition for lambs in most local areas is directly related to the scarcity of sheep and lamb packers. In 1976, only 28 plants were killing more than 25,000 head per year. These plants were owned by

[8]David L. Holder. A Tele-O-Auction for Marketing Lambs. Special Report 4, Farmer Cooperative Service, USDA, March 1974, p. 5.

Table 15—Market channels of commercial sheep producers, 17 Western States, 1974

Market channel	Percent of lambs
Packer buyer	43
Order buyer	32
Dealer	10
Auction market	10
Producer pool	3
Other	2
Total	100

Source: Gee and Magleby. Sheep Production, p. 21.

Table 16—Total marketings of slaughter lambs and percentage bought by ranking buyers, July 1969-June 1970

State(s)	1,000 head	Percent of U.S.	Percent of purchases by buyers ranking			
			1	2	1&2	1-4
Oreg. & Wash.	309	3.9	59	32	91	96
California	848	10.6	28	16	44	72
Idaho	542	6.8	37	18	55	76
Nevada	89	1.1	44	21	65	94
Arizona	124	1.5	37	37	74	93
Montana	58	0.7	46	20	66	95
Wyoming	59	0.7	54	19	73	93
Utah	315	3.9	35	35	70	93
Colorado	1,058	13.2	37	28	65	87
New Mexico	91	1.1	52	41	93	98
N. Dak. & S. Dak.	554	6.9	40	16	56	82
Nebraska	293	3.7	38	37	75	93
Kans. & Okla.	235	2.9	32	18	50	74
Texas	913	11.4	44	35	79	98
Minn. & Wis.	371	4.6	27	25	52	90
Iowa	762	9.5	40	20	60	85
Mo., Ark., & La.	160	2.0	80	9	89	99
Illinois	316	3.9	46	26	72	91
Michigan	96	1.2	42	35	77	100
Ind. & Ohio	442	5.5	28	23	51	79
Ky. & Tenn.	99	1.2	38	30	68	100
Miss., Ala., Ga., N.C., & S.C.	3	[1]	33	67	100	100
N.Y., Pa., N.J., & Del.	34	0.4	44	32	76	100
Md., Va., W.VA., & D.C.	245	3.1	69	20	89	100
United States	8,014	100.0	19	18	37	61

[1]Less than 0.05 percent.
Source: Engelman, et.al. Lamb Industry, p. 113.

22 firms. Of the 28 plants 20 slaughtered 100,000 or more head per year, and only 8 plants slaughtered 300,000 or more (table 17). The 8 largest plants killed about 55 percent of all sheep and lambs. The middle group of plants killed about 35 percent, and plants with less than 25,000 head killed about 10 percent.

The number of slaughter plants has declined rapidly in the last several years. In 1970, for example, 43 plants were slaughtering 25,000 or more head per year (table 17). Many of these plants were inefficient because of obsolescence and because of lack of volume. Hence, many were forced to close. Those that remain have considerable excess capacity. In 1970, 31 plants were killing 100,000 or more head per year. By the end of 1976, only 20 plants belonged in that category. Actually, 10 of the large plants closed and 2 slipped into the under-100,000-head size category, but 1 firm entered into the group. Eight of the closings were by the three major sheep and lamb packers. Because these firms closed only some of their plants and remained in the industry, the number of firms with plants killing 100,000 or more head decreased from 21 in 1970 to 17 in 1976.

Location

The major sheep and lamb slaughter States are Colorado, California, and Texas. These three States account for 56 percent of total U.S. slaughter (fig. 6). They also include 11 of the 20 major slaughter plants handling 100,000 or more head per year (fig. 7).

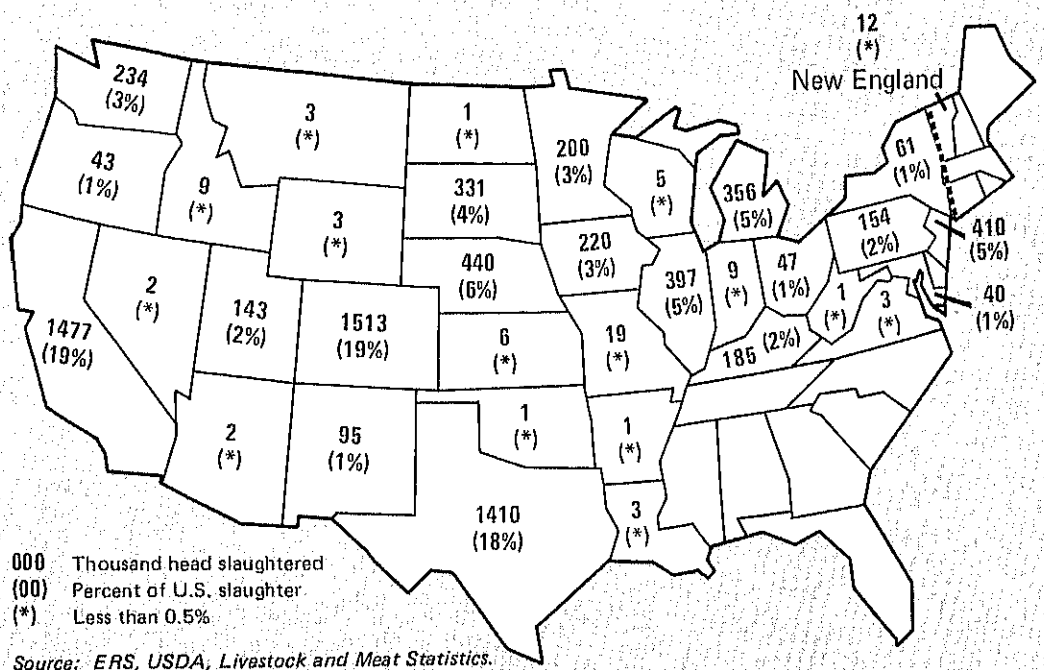
As production and slaughter numbers have declined, distribution of production among regions has shifted very little (table 1), but the distribution of slaughter has shifted closer to the distribution of production (table 18). The relative efficiency of transporting

Table 17—Number and size of sheep and lamb slaughtering plants, 1970, 1974, and 1976

Item	Number of sheep and lambs slaughtered			
	25,000-99,999	100,000-299,999	300,000 or more	Total
1970				
Number of plants	12	19	12	43
Number of firms	11	14	7	[1]27
Percentage of sheep & lambs slaughtered	5.2%	35.7%	46.1%	[2]87.0%
1974				
Number of plants	11	14	13	38
Number of firms	11	13	7	[1]29
Percentage of sheep & lambs slaughtered	5.4%	27.0%	63.6%	[2]96.0%
1976				
Number of plants	8	12	8	28
Number of firms	8	10	7	[1]22
Percentage of sheep & lambs slaughtered	4.3%	32.8%	54.3%	[2]91.4%

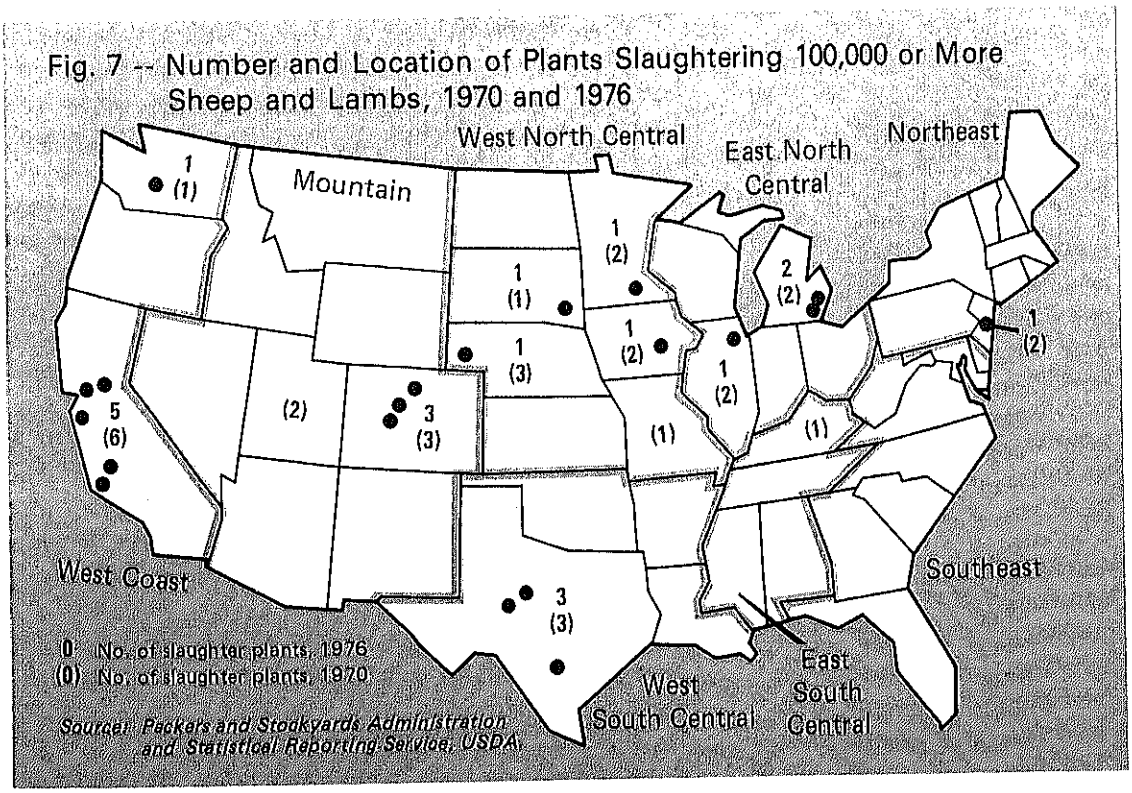
[1]Numbers in each row do not add to total because of multiplant firms with plants in more than one size group.
[2]Plants slaughtering less than 25,000 head make up the remaining slaughter volume
Source: Packers and Stockyards Administration and Statistical Reporting Service, U.S. Department of Agriculture.

Fig. 6 -- Commercial Sheep and Lamb Slaughter, United States, 1975



Source: ERS, USDA, Livestock and Meat Statistics.

Fig. 7 -- Number and Location of Plants Slaughtering 100,000 or More Sheep and Lambs, 1970 and 1976



Source: Packers and Stockyards Administration and Statistical Reporting Service, USDA.

Table 18—Distribution of commercial sheep and lamb slaughter, by region, selected years, 1944-75

Region[1]	1944	1950	1960	1970	1975
			Percent		
West Coast	13.3	15.5	17.9	18.6	22.4
Mountain	3.7	6.8	12.3	23.1	22.4
West North Central	39.7	36.8	32.1	22.7	15.5
West South Central	6.1	5.3	8.1	12.9	18.0
East North Central	18.5	13.5	11.1	10.9	10.5
East South Central	1.2	1.6	1.8	1.9	2.4
Northeast	16.6	19.8	15.9	9.4	8.3
Southeast	.9	.7	.8	.5	.5

[1]See footnote 1 to table 1 for list of States in each region.
Source: Engelman, et al. Lamb Industry, p. 11; ERS, USDA. Livestock and Meat Statistics.

lamb carcasses and primals instead of live lambs[9] will cause slaughter to continue to come in line with production.

From 1970 to 1976, the number of plants in the four Eastern Regions was reduced from seven to four. The number in the West Central Region was reduced from nine to five; in the Mountain Region from five to three; and West Coast Region from seven to five. The West South Central Region maintained three (fig. 7). All except four major plants are now west of the Mississippi River where production is concentrated.

The major exceptions to the generalization of slaughter moving toward production are in the West Coast and Mountain Regions. The West Coast has achieved a share of sheep and lamb slaughter roughly double its share of ewes on farms, while the Mountain Region has a share of slaughter well below its share of ewes. Part of the discrepancy can be explained by the production and movement of feeder lambs that is not taken into account by the number of ewes on farms. Feeder lambs often move to a different region from where they were born, and they should be slaughtered in the regions where they are fed.

A rough estimate of the surpluses and deficits of feeder lambs and total animals for
· was made in table 7. These estimates are necessarily rough because of the nature
:vailable on disposition of lamb crop, feedlot turnover rates, and culling rates of
:s. Nevertheless, these estimates are believed to be "in the ball park" and should
magnitude of surpluses and deficits in each State, an important factor in relo-
ughtering capacity.
:der lambs move eastward and westward out of western mountains in the fall. A
nber of lambs are fed in Colorado where the region's three remaining large
plants are located. The large feeding activity in Colorado actually caused the
: Region to have a net deficit of 517,500 feeder lambs. The West Coast Region
icit of 315,400 head. The deficits probably were satisfied from the 747,200 lamb
Texas.
er making adjustments for feeder lamb movements, it can be seen that the West

: G. Anderson and Wayne W. Budt. A Rate/Cost Analysis of Nebraska Meat Trucking Activities With Live-
:g Cost Comparisons. Research Bulletin 269, Agricultural Experiment Station, University of Nebraska-Lincoln,

Coast had a deficit of 473,500 slaughter sheep and lambs in addition to its deficit of 315,400 feeder lambs. The Mountain Region, however, is a large surplus producer of sheep and lambs. In addition to exporting 517,500 feeder lambs, the region exported a combined total of 1.5 million spring lambs, cull sheep, and fed lambs for slaughter. Colorado was the only State in the region that had a deficit (table 7).

There appears to be a great need for adding slaughter capacity in the northern part of the Mountain Region, but three factors are working strongly against new investments at this time: (1) the long downward trend in sheep production; (2) the large amount of excess slaughter capacity already in existence in other regions; and (3) the seasonal supply of sheep and lambs in the Mountain Region.

It was estimated that only 38 percent of total available slaughtering capacity in the United States was being used in 1973.[10] Since then, more plants have closed, thereby reducing capacity, but sheep slaughter also has continued to decline. The number of plants will probably continue to decline in the future, even if the downward trend in production is halted or even modestly reversed, because the industry has an extraordinary amount of overcapacity. Most of these plant closings will happen very rapidly if a large number of ewe lambs are held back to achieve a rapid turnaround in production (tables 10 and 11).

Evaluation of Industry Situation

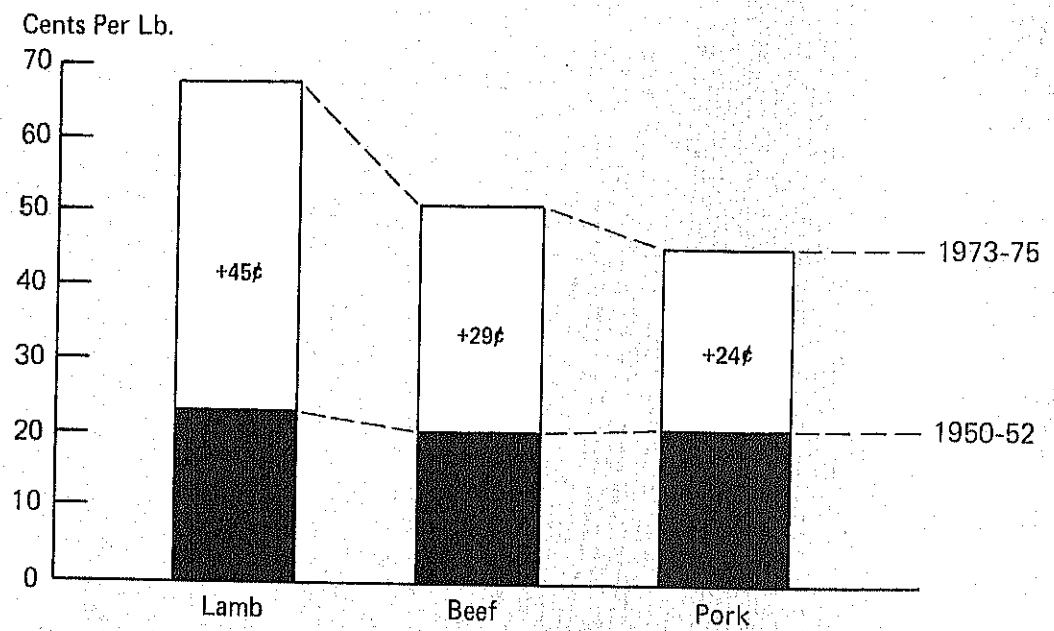
Producers wishing to remain in the sheep business are faced with noncompetitive markets for live sheep and lambs and an inefficient system to produce, assemble, slaughter, process, and distribute lamb and mutton products. The declining sheep population has forced many slaughter plants to close because they could not receive enough lambs on a regular basis to operate profitably, and remaining packers have no confidence for investing in new, modern, efficient plants. The extent of overcapacity in the industry and obsolescence of existing plants indicate that more plants will close in the future.

As packing plants close, producers face a continuing decline in the number of buyers bidding on lambs. Transportation costs to slaughter are increasing because of longer distances to operating plants. If the industry continues to follow the pattern of the past 15 years, the cost of getting animals slaughtered and processed and distributed to consumers will continue to increase. This increased cost must be passed on to producers in the form of lower farm prices and to consumers in the form of higher retail prices. However, the price of lamb at retail is closely related to the prices of beef and pork, which are expected to be in adequate supply from a relatively efficient production-distribution system. Hence, sheep producers are going to suffer most of the consequences of an inefficient system from farm gate to consumer.

The net effect of inefficiency in assembling, processing, and distributing lamb can be seen in the large increase in the farm-retail price spread for lamb relative to beef and pork. The farm-retail price spread accounts for the total marketing-processing-distribution cost from farm to retail customer. From 1950-52 to 1973-75, the spread increased from 22.6 cents per pound (retail) to 67.4 cents for lamb, while the price spreads for beef and pork only increased from 20.8 to 50.5 and from 21.0 to 44.6, respectively (fig. 8). The difference in spread is likely to become greater in the years ahead if lamb volume continues to decline and changes are not made in the marketing-processing-distribution system.

[10]Allen J. Baker. Federally Inspected Livestock Slaughter by Size and Type of Plant. Stat. Bul. No. 549, ERS, USDA, May 1976, pp. 9-10, 57.

Fig. 8 -- Farm through Retail Marketing Cost for Lamb, Beef, and Pork



Source: ERS, USDA, Livestock and Meat Statistics.

If producers are interested in staying in the sheep business and in receiving their fair share of the benefits from it, they must take the initiative at least to stop the downward trend in production, and perhaps turn it around. Some reorganization of the industry is also needed. Production could be concentrated in certain areas so as to avoid hauling live lambs long distances to slaughter. Seasonality of production could be reduced to make more efficient use of production, marketing, and processing facilities, and to maintain retail markets. Marketing systems could be streamlined. Some packing plants could be owned by producers to give them a fair return for their lambs in a relatively non-competitive market.

MARKETING, PROCESSING, AND DISTRIBUTION ALTERNATIVES

Several alternative marketing and processing opportunities for producers exist via cooperatives. Three marketing alternatives and five processing alternatives are: tele-auction, forward deliverable contract market, and bargaining; custom processing, joint venture, leasing, buying an established plant, and building a new plant. A custom lamb feeding operation could complement any marketing or processing alternative chosen.

"Processing" is used as a general term referring to slaughtering, cutting, and further processing of lamb. Slaughtering by itself tends to be a low-margin, low-profit operation; however, slaughtering is the source of raw material for the more profitable activities of cutting, further processing, and merchandising the product. Because the last activities are the more profitable aspects of meatpacking and because a cooperative cannot engage in

them without slaughtering, a cooperative should consider all of these related activities as a single program. Therefore, "processing" is used to imply all of these related activities.

Some general estimates of investment capital and operating costs have been developed to aid in the comparison of several marketing and processing alternatives. All capital and cost estimates are for a range of conditions that will vary widely with local conditions. The actual requirements will depend on the size of the cooperative marketing or processing operation, size of farms, distances to be traveled, amount of volunteer and public assistance available, existence of established packing firms, and other variables. The following analysis is intended to help producers choose a few suitable alternatives on which to conduct a more detailed feasibility study before actually committing their capital and lamb production.

Marketing Versus Processing

How far should producers go to assure themselves a profitable position in the sheep industry? They could enter with a strong marketing effort and leave processing to non-cooperative firms, or they could engage in processing activities themselves. They could also merchandise lambs to retailers or direct to consumers.

Marketing sheep and lambs to packers generally requires less capital investment, less risk, and lower operating costs than processing. Less capital is needed for marketing because the facilities are not as elaborate, nor is the handling procedure as long nor as complicated. Hence operating costs are also lower. Less risk is associated with marketing because of smaller capital investment and smaller chance of failure. Table 19 shows the relative investment requirements for establishing selected marketing and processing alternatives. More detailed descriptions of these alternatives follow this brief comparison.

The simplest and least capital intensive system considered in this study is the teleauction. It could be organized and put into operation for about $0.20 to $0.40 per head of annual capacity. For example, a teleauction designed to handle 200,000 lambs per year would require an initial investment of $40,000 to $80,000 to put the organization together, encourage producer membership and participation, and pay other startup expenses. Once the teleauction was started, a commission fee would be charged to cover all operating expenses. The next two alternatives, bargaining and forward deliverable contract market, will require about twice the investment needed to establish the teleauction.

Producers' entry into processing would require considerably more capital per head of annual capacity than marketing. The simplest and least capital intensive way for producers to get into processing would be to form a cooperative that would make specified arrangements with an existing packing firm. One arrangement would be a contract with the packer to process and merchandise the producers' lambs on a custom basis. The investment would range from $1 to $8 per head, being closer to the larger estimate if the cooperative assumed most of the inventory, accounting, and merchandising functions. Another cooperative-packer arrangement would be a "joint venture," which is more like a partnership arrangement. The investment would likely run between $1 and $6 per head. The upper end of the range is somewhat less than for custom processing because in the joint venture the cooperative and packer would share in the investment and in the profits of the operation. The joint venture probably would involve a more formal, long-term agreement than custom processing.

The differences in investment for leasing an existing plant, buying such a plant, or building a new plant are relatively small. In all three approaches the cooperative would assume responsibility for all essential functions, and would make necessary investments

for organization, acquiring the use of building and equipment, operating capital, market development, and contingency reserve.

Leasing may provide good facilities with a minimum of investment in facilities themselves. Buying an existing plant may also provide good facilities at a depreciated cost. Leasing or buying an existing plant may also provide a developed market at a very reasonable cost, hence the possibility of a lower investment than when buying a new plant.

Because of the relatively low capital investment required for the marketing alternatives, producers could control the merchandising of a given number of lambs through marketing with fewer resources than through processing. Or, looking at it another way, producers with a given bundle of resources to invest could control a larger share of the market by investing in marketing than in processing. Unless a cooperative can achieve some significantly new economies in processing, producers are likely to earn a much higher return on their investment by marketing rather than by processing.

Because of the relatively low capital investment, marketing activities could be undertaken immediately and without much regard for whether production was going to turn around. If production did not turn around, little capital would be lost when volume became so small that the cooperative had to cease operations. If production did turn around, however, producers would have an operating system that could be expanded, or even converted into a processing enterprise. One very real problem facing a packer is that of obtaining a sufficient flow of sheep and lambs to slaughter. An established marketing cooperative could have that flow worked out before attempting to move into processing.

Processing not only requires producers to commit their capital for acquiring slaughtering facilities and meeting operating needs, it also requires producers to commit their lambs. Once the capital is committed, individual producers cannot be permitted to withdraw from the cooperative, thereby reducing volume, increasing the average cost per head for those remaining, and eventually forcing the plant to close. A new cooperative plant would have to require producers to commit their lamb production for 5 years to have some assurance of recovering their investment.

On the other hand, a processing cooperative puts producers in control of production and processing activities. A cooperative plant means that producers: (1) would make the decision about closing the plant; (2) could sell on a carcass basis with confidence, and be paid according to carcass value of their lambs; (3) would be involved in decisions on procurement methods, processing, product development, packaging, etc.; and (4) would share in profits and losses, thereby tending to stablize their incomes.

Table 19—Investment requirements for establishing cooperative marketing and processing systems

System	Investment per head of annual capacity
	$.20-.40
	.40-.75
	.50-.85
	1.00-8.00
	1.00-6.00
	7.00-12.00
	10.00-16.00
	12.00-17.00

One of the advantages of processing instead of marketing live lambs is the ability to remove the pricemaking decision from the farmer-packer level to the packer-retailer level. The scarcity of buyers at the farm level, especially in local areas, results in pricing inaccuracies exhibited in wide day-to-day price swings, price differentials among regions, and other abnormal phenomena. Producers would have more flexibility, hence more market power, at the wholesale level than at the farm. The cooperative would have access to more buyers, could provide a greater variety of products, and could consider storage as an alternative to selling.

Another advantage to processing is improved communication between consumers and producers. A single cooperative firm probably could better translate market signals of the retailer and supply signals of the producer into a quality product delivered at least cost than the present system with several intermediary firms.

Marketing

Teleauction

A teleauction operates much the same as a conventional auction with an auctioneer announcing successively higher prices as long as buyers continue to bid. The animals are sold to the last remaining (highest) bidder. The major difference between a teleauction and a conventional auction is that in a conventional auction the auctioneer, buyers, and animals are at the same location, whereas in a telauction each may be at an entirely separate location. Auctioneer and buyers are connected by a conference telephone call. The animals remain on the farm and are sold on the basis of a description of their sex, weight, grade, location, and other factors.

The teleauction process begins about 10 days before a given sale when a producer informs the cooperative of his intention to sell. The cooperative grades the lambs on the farm and the farmer completes a consignment form committing his lambs to the sale. The cooperative organizes all the consignment papers to form truckload lots of lambs of uniform grade and weight. On sale day the buyers are connected to the conference telephone network and given the location and description of each load of lambs for sale. Then the auction takes place. After the sale, the cooperative contacts each successful buyer to establish a delivery day, as the buyer can choose any of the next 7 days for delivery. The cooperative calls all consignors to each load and tells them when to deliver their lambs. The lambs are assembled and shipped on schedule.[11]

The teleauction is advantageous to both producers and buyers: (1) Producers have a marketing system that they control and establish operating procedures; (2) lambs from several locations can be sold at once, thereby making the system more efficient for producers and packers; (3) packers "attend" the sale by telephone, thereby reducing travel expenses and the number of buying personnel needed if a large proportion of sheep and lambs are sold this way; (4) packers may buy a whole week's kill on one day and schedule deliveries for efficient use of the packing plant; (5) sheep and lambs move quickly from farm to slaughter plant with a minimum of handling and waiting in stockyards, hence there is a minimum of bruising, shrink, and death losses.

The teleauctions have been successful in raising prices paid to producers. In the Virginia-West Virginia area producers using the teleauction are receiving $2.50 per cwt

[11] A more detailed description of this system as used in Virginia is explained by David Holder in A Tele-O-Auction for Marketing Lambs. Special Report 4, Farmer Cooperative Service, USDA, March 1974.

more than they were in conventional auctions. By comparing the prices for lambs in Virginia auctions with the average price paid by U.S. packers, it can be shown that the conventional auctions now pay $2.00 per cwt more than they would without the teleauction. The additional $0.50 per cwt received by teleauction patrons is attributed to the added convenience to packers.[12]

In the Oregon-Idaho area, the teleauction is used by farm flock operators. They used to sell in conventional auctions. While the teleauction has not raised prices in conventional auctions as in Virginia, it has given the farm flock producers prices that are comparable with large range flock sales, a gain of $2-$4 per cwt.

Both teleauctions are being used to sell truckload lots of cull ewes at prices that are often $5-$7 above alternative market channels. The Oregon-Idaho teleauction is also selling feeder lambs.

Teleauction commissions for sheep and lambs are currently $0.95 per head in Virginia and $1.05 in Idaho. The commission is used in the following manner:

$0.30	Assembly
.25	Grading
.15	Telephone
.15	Paying and bookkeeping
.15	Other
$1.00	

Some large producers with a full truckload of lambs for sale at one time are eligible to pay only a $0.55-per-head commission because they do their own assembly and most of their own grading.

It should be noted that very little capital is need to begin a teleauction. About $0.20 to $0.40 per head of annual capacity is sufficient to finance the organization and promotion of the cooperative, meet startup expenses, and provide working capital. Neither of the teleauction cooperatives currently in operation owns any facilities. Instead, all assembly services are contracted with local assembly yards as needed. Virginia also contracts with local auctions to handle all financial transactions, thereby eliminating the need for much working capital and the need to be registered and bonded with Packers and Stockyards Administration.

Another advantage of the teleauction is that it is maintaining an open market for sheep and lambs where any producer can sell and where public prices are made known to all producers. Producers keep all of their traditional decisionmaking functions and enter the market when they believe their lambs are ready for slaughter. Nevertheless, the cooperative knows what weights and grades of lambs sell best and can encourage its producers to make worthwhile improvements. Often this is a matter of simply adjusting the finishing time.

In the future, cooperatives could take a stronger position by establishing quality specifications and controlling the seasonality of lambs coming to market if buyers would be willing to pay a premium for having a more year-round supply of a given quality lamb available.

Teleauction could be used to establish a national market for sheep and lambs. Technologically, it is possible to have one teleauction for the entire United States. It may

Tel-O-Auction.

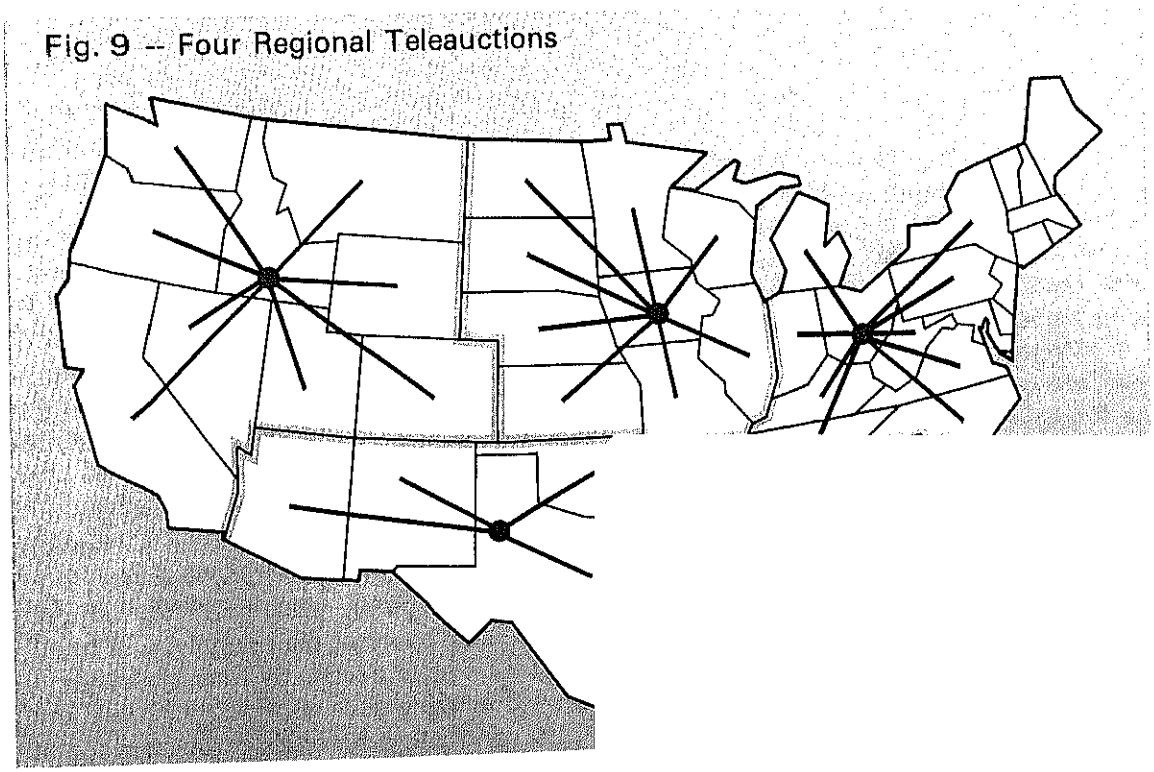
be more practical, however, to establish four regional markets. East Coast and Northwest teleauctions have been started already. They should be expanded. Many discussions have been held concerning a Midwest teleauction. One is also needed in the Southwest. Figure 9 shows the area that could be included in each teleauction. The exact boundaries may vary depending on how groups of producers decide to join together.

If these regional systems are established, it may be necessary to substitute teletype equipment for the conference telephone system. A teletype system can handle a larger volume of sales per hour, discriminate between simultaneous bids to 1/1000 of a second, and provide a printed confirmation of each sale. Teletype is used in Canadian Provinces to sell slaughter hogs.

It is possible also to use a computer and remote computer terminals to conduct the sale. TELCOT is a computerized marketing system currently used by Plains Cotton Cooperative in the Southwest to sell cotton. In a computerized system, both the buyer and the seller bid. The computer matches similar bids after making adjustments for transportation cost.

The teleauction is well suited to today's sheep and lamb market where producers and packers are quite dispersed and packers are relatively few. It is an efficient method for bringing buyers and sellers together and to make transactions. However, if the rapid rate of plant closings continues, any form of open competitive marketing will soon be obsolete. There will not be enough competitors. Even today, with plants several hundred miles apart, it is possible for the plant nearest the producer to have an advantage because of transportation cost. For example, a nearby packer could bid a little more for the lambs in its area than many other packers and still have the lambs delivered to its plant for $0.50 per cwt less. The full economic location advantage of a nearby plant probably will not flow to producers unless they can bargain with the packer or own the plant themselves.

Fig. 9 -- Four Regional Teleauctions



Bargaining

Producers may decide to form a cooperative to assemble livestock and negotiate prices with packers. Pricing by means of group negotiation or bargaining generally requires more skill than operating an auction. Where an auction pits buyer against buyer, bargaining pits seller against buyers. In other words, the cooperative bargaining association must take an adversary position.

The total investment to organize, promote, and provide operating capital for a bargaining association is estimated to be $0.40 to $0.75 per head of annual capacity. It would be more costly than the teleauction because bargaining is less familiar to producers and would require the use of contracts. The bargaining alternative also lacks the existence of an ongoing bargaining system for sheep and lambs from which to model any new association. The cost of operating the association would probably be less than $1 per head.

Private negotiation of prices is not new to lamb producers. Most lambs are currently sold by producers negotiating prices with packer buyers and dealers. Most producers, both large and small, would probably benefit from establishing a cooperative to negotiate for them. The cooperative could hire professional salespeople and supply them with adequate market intelligence. In addition, the cooperative could represent a large number of producers. A single cooperative with a large volume of sheep and lambs could simplify the procurement activities of packers, thereby reducing their costs. At the same time, the cooperative could reduce the number of alternative places where packers could buy, thereby giving producers more market power by which to demand their price and their own terms of trade.

The bargaining procedure would provide many options. It could be used to sell lambs for either immediate delivery or delivery several months later. It could be used also to sell individual truckloads of lambs or a package of several truckloads. The latter could be delivered all at once or scheduled over a period of several weeks. For example, a bargaining association could negotiate a single contract with a packer in April to deliver one truckload of choice spring lambs each working day during June, July, and August. Without a cooperative, and producers committed to their cooperative, such a promise would be difficult to keep.

If bargaining results in arrangements of one or more months in advance of delivery, two sets of contracts are likely to be used. One set would specify a producer-member's agreement with his cooperative. These contracts would assure the cooperative that it would have the number, weight, and quality of sheep and lambs and the timing of deliveries necessary to fulfill the second set of contracts. The second set would specify the terms agreed to by the cooperative and packers.

Present-day examples of cooperative bargaining include several lamb pools that negotiate with packers to price their pools, mostly for immediate delivery. More recently, the Rocky Mountain Sheep Company in Idaho was formed to negotiate forward contracts on range bands up to several months in advance of delivery.

Day-to-day, or weekly, bargaining usually results in a verbal agreement on a specific price to be paid on delivery. Longer term bargaining (2 or more weeks in advance) usually results in a written agreement that contains a specific price or an agreed on pricing formula. The formula price will usually depend on a public price quotation at the time of delivery. Packers are not likely to contract a large share of their supply at a fixed price several months in advance, because of the risk of a price decline by time of delivery. At the present time, there are no futures markets for hedging such contracts as there are for hogs and cattle. Before longer term, fixed-price contracting becomes commonplace, a

futures market would have to be implemented, or all packers would have to simultaneously contract in advance to secure an adequate supply. If most packers purchased most of their lambs at about the same time several months in advance of slaughter, individual packers would not be threatened by the possibility of a competitor being able to buy most of its supplies at a lower market price at delivery time.

Forward Deliverable Contract Market

For producers who believe that there are many advantages to contracting but prefer an open market pricing system to a bargaining system, there is the possibility of establishing a "forward deliverable contract market" (FDCM). Like a futures market, a limited variety of contracts would be bought and sold. But unlike the futures market, the FDCM would require buyers and sellers to follow through with their contracts rather than cancel them with offsetting transactions.

FDCM would permit producers and packers to initiate transactions simultaneously. A producer would call the FDCM system and offer to sell a group of lambs at a specified price. A packer would also call and bid to buy a group(s) of lambs at a specified price(s). The market would match similar offers and bids after making appropriate adjustments for transportation costs. Whenever a match was found, the producer and packer would have a contract that would be consummated with delivery. When a match could not be found for an incoming offer or bid, the entry would be held in an open file until a match is found, or the bid or offer is changed or withdrawn.

An initial investment of $0.50 to $0.85 per head of annual capacity would be needed to develop and implement FDCM. Operating expenses would be less than $1 per head. The FDCM system might begin by simply receiving offers and bids by telephone and matching similar bids and offers by hand. If volume increased to around 1 million or more head a year, computerized matching might be justified.

The added advantage of FDCM over a weekly transaction is that of improving the coordination of production, processing, and consumption. If contracts were traded before breeding decisions were made, quality could be improved and seasonality of production reduced where the market generated sufficient price incentives for changing from traditional production patterns.[13]

Custom Feedlots

Traditional lamb production in most regions of the United States is very seasonal with lambs coming to market for only a few months out of the year. Many producers ship all their lambs to market at one time. Some lambs have sufficient finish to be slaughtered and the rest have to be fed for a month or more. A marketing or processing cooperative may find it advantageous to establish some custom feedlots in areas where feeding can be accomplished efficiently. Producers of feeder lambs could be encouraged to retain their lambs and place them on feed. Such an operation may not be feasible for individual producers but may work well as a cooperative enterprise. Then the cooperative could offer the fed lambs to packers as part of a longer term supply contract. If the cooperative is going to engage in processing, a feedlot operation may be essential to keep a steady flow of lambs to the plant over a period of several months.

[13]David L. Holder and Thomas L. Sporleder, "Forward Deliverable Contract Markets," Leaflet No. 4 in Marketing Alternatives for Agriculture: Is There A Better Way? National Public Policy Education Committee Publication No. 7, Cooperative Extension Service, Cornell University, November 1976.

In both of the above cases, cooperative capital and personnel requirements could be kept low if the feedlots could be leased instead of owned.

Processing

When producers enter processing, the investment in plant and equipment is a major item, but as illustrated in the section below on ownership of a new plant, plant and equipment may account for only one-fourth of the total investment required. Another fourth will be needed for operating capital; another for promotion, organization and market development; and a final fourth for a contingency fund against adverse market conditions. Consequently, a sizable investment may be required even if a plant is leased and there may be little difference in investment required for the three alternatives of leasing, buying an existing plant, or building a new plant.

Custom Processing

Custom processing is a relatively simple method for putting producers into the sheep and lamb processing business with relatively little investment and risk. Producers form a cooperative that negotiates a contract with a packer to process producers' lambs on a fee basis. The packer may be one that regularly kills lambs, or it may be a hog or veal-calf packer seeking a way to increase the utilization of plant, equipment, and labor. Some packers may be willing to add a new lamb killing line if a satisfactory long-term arrangement could be made with a producers' cooperative.

A contract would specify such things as maximum holding time prior to slaughter, type of trim, types of cuts, packaging, and processing fees. The packer would specify the custom processing fee based on the number of head or pounds processed, and may specify a minimum fee for each month. The fee for a simple kill, chill, and ship operation would average about $4 to $6 per head, which is the cost of operating a new plant, paying depreciation and interest, plus providing a profit for the plant owners. If the packer retains the pelt and byproducts and has a good market for them, the fee could be substantially lower.

The lamb products may be sold in a variety of ways. The simplest way is to include selling in the custom processing contract, using the packer's regular salesforce and established market channels. For the added service, a higher fee would be charged, but this may assure the producers of a market for their lamb. However, producers must recognize that the packer has a built-in conflict of interest if it also sells its own lamb in the same market channels. The packer probably will sell its own lamb first and at more favorable prices than the producers' lamb. The producers' lamb would probably end up in the packer's secondary markets at a lower price. A carefully worded contract may avoid some of these problems. For example, the contract could state that producers' lamb be paid at the average price of all similar products whether owned by the cooperative or by the packer. Such a condition would encourage the packer to negotiate prices for the cooperative's lamb which are as favorable as prices for his own lamb.

The cooperative must retain the right to have a representative in the plant while members' lambs are being processed. If the packer also sells the producers' lamb, the cooperative must have some access to the plant's sales records to maintain the integrity of the contract.

If the packer is going to sell the producers' lamb, the producers ought to consider the impact of their added volume on the operation. More lambs to kill could improve processing efficiency, but more lambs also may overload cooler space and encourage dis-

tress sales. Or the added volume may saturate the packer's market and force down his usual wholesale price.

Another method of selling is to hire a third party, or broker, to merchandise the lamb. The use of a broker would reduce the packer's conflicts of interest. On the other hand, the broker may be less flexible in the amount of product he can move each week. He may require a fairly uniform flow to develop and maintain a good market. A custom packer, on the other hand, may be able to adjust his own lamb kill to compensate for changes in the cooperative's volume.

Producers' investment in a custom processing operation could range from $1 to $8 per head of annual capacity. The investment will increase as the cooperative takes on more functions and leaves fewer functions for the cooperative packer. For example, if the cooperative assumes the responsibility for holding inventories on its own account, developing the market, merchandising and distributing the products, the investment would be toward the $8 end of the investment range. If the packer performs most of these functions, a much lower investment would be required, but the custom fee would have to be higher. The packer may ask producers to share in some of the investment if the plant has to be modified substantially or if new markets have to be developed.

Joint Venture

A joint venture is like a partnership arrangement between a cooperative and a packer. The packer may be a sole proprietor, partnership, corporation, or another cooperative. A joint venture means that the cooperative and the packer maintain their individual identities, but they enter into an agreement to conduct one or more specified activities of mutual benefit. The arrangement usually involves a written agreement between the two companies and may result in the formation of a third company, which would be governed by a separate board of directors. In the agreement the cooperative must take on the responsibility of supplying the joint venture with a year-round supply of quality lambs on a regular basis. The packer would supply processing and distribution services and must develop and maintain a market for the lamb products. The cooperative would gain access to the packer's markets, and the packer, in turn, would gain access to a controlled supply of quality lambs. Hence, both would benefit.

Rather than simply pay a custom processing fee, the cooperative would share the profits and losses from the joint venture, at a rate determined by the joint venture agreement. Considerable detail will have to go into specifying the profit sharing plan, especially if the packer continues to process some lambs on his own account. The cooperative must insist on having adequate access to the packer's accounting and other records and agree to the accounting procedure by which profits and losses are to be determined. In a joint venture, the cooperative becomes more involved in the internal affairs of the packer than in a strictly custom processing arrangement.

The bargaining position of the cooperative would be stronger if it could market lambs to other packers at the same time it engaged in processing, but current Packers and Stockyards Administration regulations prohibit a firm from engaging in live animal marketing and slaughtering simultaneously.

While a joint venture would usually result from a cooperative making an agreement with an existing lamb packer, it is entirely possible for the cooperative to enter into a joint venture with a packer that has never processed lambs. This may be an entirely new packer or an existing packer desiring to add a line of lamb products. A potential new packer in today's lamb industry may not be willing to risk market entry without an assured source of supply. The cooperative could provide that supply. With a new packer,

the cooperative would share the risk of successful market entry, and should be adequately compensated for it by getting a larger share of profits than in a joint venture with an established firm.

Producers' investment in a joint venture is likely to range from $1 to $6 per head. The maximum investment would likely be smaller than in a custom arrangement because in a joint venture the packer would probably contribute a share of operating capital, market development costs, and contingency fund.

Producers would achieve the following advantages from a joint venture with a packer: (1) greater access to the packer's records and greater understanding of the packer's operation than in custom processing; (2) direct interest in processing without the large investment needed to operate their own plant; (3) expertise in processing and meat distribution; and (4) assistance in obtaining sufficient capital.

A packer would gain the following by entering a joint venture: (1) an assured supply of lambs for efficient utilization of plant, equipment, and labor; (2) a sharing of price risks often associated with securing a supply of lambs several months in advance of slaughter; and (3) an additional source of capital for operating or expansion.

Leasing

Producers could enter the processing and distribution stages by forming a cooperative to lease an established processing plant. The cooperative's own board of directors would be fully responsible for hiring an experienced manager and establishing guidelines leading to the operation of the plant. All net profits (and losses) would belong to the cooperative.

One of the cooperative's biggest challenges would be to keep the plant operating near capacity, for regardless of whether it operated at capacity or remained partially idle, the plant owners would want to be paid. Whenever volume slacked off, unit costs would rise and profits would decline. A cooperative, however, could be more successful than an independent packer if individual producers were committed to deliver to their plant on a prearranged schedule. To assure deliveries, some production contracts between the producers and their cooperative probably would be needed.

The main advantage to leasing is that it gives the producers' cooperative almost complete control over the processing stage with little investment in facilities. However, the
rative would still need a considerable amount of capital. Working capital would be
! to purchase members' lambs, carry inventories, and pay day-to-day expenses. If a
f-- lamb products, developed by the plant owner did not come with the plant,
'opment capital would also be needed. Even with a market, additional
] be invested for market expansion. Also, additional capital would
'- -erating contingencies. The net result might be that leasing could require almost as much capital as buying an existing plant.

The estimated investment for leasing a plant ranges from $7 to $12 per head of annual capacity. The two major unknowns affecting the level of investment are the cost of renovating the facility and the cost of developing a suitable market for lamb products. Total operating costs are expected to be similar to those of a new plant, with the lease payments substituting for the cost of depreciation and interest in the new plant. But efficiency of an older plant probably would be less than the new one, thereby making the cost a little higher.

One final word of caution is needed for the leasing alternative. Efficient plants are not usually available for leasing. Most existing plants are obsolete, and when a firm

decides to get out of the lamb processing business it usually prefers to sell the plant and get out completely rather than lease it. The next best alternative may be to buy an existing plant.

Ownership: Existing Plant

Often, before a processing plant is closed, it is put up for sale, and producers could form a cooperative to buy one or more of these plants. A cooperative that buys its own processing plant has a high level of control over the processing function, and is in position to have considerable control over the entire production-processing-distribution system from farm to retail. As sole owner, the cooperative makes all the decisions and takes all the profits and losses resulting from those decisions.

While buying an existing plant may require more capital than leasing, the purchase of such a plant could put producers in the processing business with a smaller investment than building a new plant. The amount of investment in a cooperative buying and operating an existing plant is expected to range from $10 to $16 per head of annual capacity, depending on the price of the plant, the need for renovation, and the condition of its lamb market. A cooperative building a new plant could expect to invest a total of $12 to $17 per head.

An existing plant also could be operating smoothly without the usual "bugs" of starting a new plant and the long delay before any positive cash flow would be created. Most important is the fact that an existing plant probably would come with a well established market for its lamb products. However, producers should be most cautious in buying an existing plant in an industry that has not built any new plants or made significant plant improvements in several years, and where most plants operate at less than 50 percent of capacity. Plants usually are sold or closed when they become unprofitable. Many plants in operation today probably should be closed and remain closed.

A cooperative choosing to enter processing by means of an existing plant must be willing to hire the counsel of a competent engineering firm to evaluate the plant and to estimate the cost of making necessary renovations. Some plants could be renovated, but the added cost of renovation may bring the total investment close to the cost of a new one. If that be the case, producers would be much better off with a new plant that is modern, efficient, and properly located.

If a plant is being closed because of an insufficient supply of slaughter lambs, producers could take it over and commit all their lambs to the plant. Producers control the supply of lambs, and a processing plant owned by producers could contract with its members to supply all its needs. The contracts would have to be signed for a period of at least 5 years to enable the cooperative to recover all or most of its members' investment.

Lamb processing plants usually do not close because of a lack of market. The declining consumption of lamb products is due to the lack of supply rather than declining consumer preference. Lack of supply and an inefficient production-processing-distribution system have priced lamb out of the reach of most consumers when they have plenty of beef, pork, and chicken to purchase. The relatively inefficient marketing system for lamb is exhibited by the wider marketing margin than for beef or pork. A new cooperative might be able to reduce some of the marketing inefficiencies that exist.

In contrast to the above statement about plants being offered for sale with good markets is the actual history of the past 6 years. In that time, 8 of the 10 major sheep and lamb processing plants that have closed did not leave a good market. The eight plants were closed by the three major meat packers. They did not offer the plants for sale along with their established market channels because the packers were consolidating and serving

those channels from their remaining plants. In some instances, a major packer would have offered to buy the lamb products from the cooperative on a contract basis and distribute it in the packer's regular channels. While such an arrangement would provide a market, the cooperative would be leaving one of the more profitable aspects of the business to someone else. The cooperative would be placing itself in a vulnerable market position by having only one customer who would establish the price and most terms of trade.

Ownership: New Plant

A cooperative that decides to build a new processing plant achieves a maximum level of control over the processing function. While the actual operation would be very similar to that of an old plant, the cooperative that builds a new plant would have opportunities to make a few more decisions. These decisions include where to locate the plant, how large to make it, what type of equipment to install, and where to market the finished lamb products. The greatest advantage of a new plant would be having an efficient facility in a good location.

Of course, there also would be some disadvantages to a new plant in comparison with other alternatives. One would be risk. The size of the total investment per head would be larger than in most other alternatives, and there would be a greater chance of failure. There might be a long period (about 2-3 years) with only negative cash flow while the plant is being built and started. New labor would have to be recruited and trained. A market would have to be developed. While the cooperative could make more decisions with a new plant than with an old one, it could also make more mistakes.

The cooperative that builds a new sheep and lamb slaughtering plant, with capacity to slaughter 250,000 head per year and sell whole carcasses would require an investment of about $12 to $17 per head, or a total of $3 million to $4.3 million (in 1975). About one-fourth of the investment would be used for land, site development, buildings and equipment; one-fourth for operating capital; one-fourth for organization, promotion, and market development; and one-fourth to set aside for contingencies (table 20). Producers

Table 20—Investment requirements for a new cooperative sheep and lamb slaughtering firm killing 250,000 head per year, 1975

Item	Total	Producer equity	Borrowed funds
Plant			
Land	$90,000		
Waste treatment	60,000		
Site development	50,000		
Building & equipment	800,000		
	1,000,000	$500,000	$500,000
Operating capital	1,000,000	250,000	750,000
Project promotion and organization	250,000	250,000	0
Market development	500,000	250,000	250,000
Contingency fund	750,000	200,000	550,000
Total investment	3,500,000	1,450,000	2,050,000
Total per head	14.00	5.80	8.20

would be expected to provide about $1.5 million equity capital, about $5.80 per head. The balance could probably be borrowed from the bank for cooperatives or several commercial lenders.

The contingency fund would be necessary to protect the cooperative from periods of adverse financial conditions, especially in the early years of its life. The market development money would be needed in addition to normal selling and product promotion expenses to create markets for products of the new firm. The amount needed would vary with the method of distribution chosen. More dollars would be needed if the cooperative uses its own salesforce rather than a broker because a broker might have established outlets for lamb or might share some of the market development cost.

The cost of operating the new plant is estimated at about $4.45 per head (table 21). Variable costs, which are about 50 percent labor expenses, amount to $2.23 per head, and fixed costs are $2.22 per head. About 45 percent of the fixed cost is depreciation and interest.

Profitability of the firm is measured in terms of net margin (net payment) to producers versus market price on a hundredweight (cwt) basis (table 22). For the first year, or possibly 2 years, the firm would pay producers $2.38 below market price because of startup expenses of promoting the project to producers, organizing the cooperative, and developing a viable market. After the startup period, the cooperative would pay $0.35 per cwt above the going market price. In addition, producers would receive 9 percent interest on all capital they invested. While in actual practice this interest money would be retained by the firm, it is included in the analysis to help producers evaluate an investment in processing versus other types of investment opportunities.[14]

This example assumes that the market price for live lambs would be $44.45 per cwt and the wholesale carcass price would be $92. If the cooperative received more or less than $92 per cwt for carcasses, the profitability of the firm would be adjusted accordingly. The example also assumes that the plant will be operated near 100 percent of capacity. The cooperative may have trouble maintaining such a year-round level of utilization unless its members are firmly committed by contract to deliver lambs to their cooperative. If, for example, utilization dropped to 75 percent of capacity, operating costs per head would increase from $4.45 per head to $5.20 per head, and net margin would be reduced by $0.75 per head.

Profitability probably could be enhanced by adding the capability of producing primal cuts or even frozen portion cuts in the cooperative plant. It is estimated that the investment would have to be increased by $1 and $2 per head, respectively. Operating costs would be increased by $2 and $4 per head. Net margin per head to producers would be expected to increase by about $0.30 per cwt (live basis) if primal cuts were sold from the lamb carcasses, and $0.55 per cwt (live basis) if frozen retail cuts were produced.[15]

Distribution

The distribution of lamb products from processing plant to consumer includes many interrelated factors that must be carefully selected. These factors include the selection of a target market, product form, method of distribution, and brand. While these factors are somewhat removed from basic lamb production factors, it is extremely

[14]Derived from Hudson A. Glimp. Feasibility of Locating a L
stone Area Vocational-Technical School, 1975.

[15]*Ibid.*

Table 21—Annual operating expenses for a new cooperative sheep and lamb slaughtering plant killing 250,000 head per year, 1975

Variable expenses		
Labor	$250,000	
Foreman	18,000	
Payroll taxes and fringe benefits	40,000	
Supplies	125,000	
Utilities	65,000	
Maintenance	60,000	
Total variable expenses	558,000	
Per head expenses		$2.23
Fixed expenses		
Manager and office salaries and fringe benefits	60,000	
Lamb buyer and expenses	75,000	
Marketing	63,000	
Real estate taxes	39,000	
Telephone	12,000	
Legal and accounting	24,000	
Insurance	18,000	
Interest on operating capital[1]	90,000	
Interest and depreciation on plant[2]	150,000	
Miscellaneous	24,000	
Total fixed expenses	555,000	
Per head expenses		2.22
Total operating expenses	1,113,000	
Total expenses per head		4.45

[1]Perpetual debt on operating capital at 9 percent; interest paid on borrowed capital and membership capital.
[2]Amortization of plant (except land) in 10 years at 10 percent interest = 15.6 percent per year; plus perpetual debt on land at 9 percent; interest paid on borrowed capital and membership capital.

Table 22—Profitability of a new cooperative sheep and lamb slaughtering plant killing 250,000 head per year, 1975

Item	Year 1	Year 2-10
Gross sales		
Lamb carcasses (54 lbs. at $0.92)	$12,420,000	$12,420,000
Byproducts ($4.05/head)	1,012,500	1,012,500
Total sales	13,432,500	13,432,500
zation	1,113,000	1,113,000
it	250,000	—
	500,000	—
	1,863,000	1,113,000
ucers	11,569,500	12,319,000
) cwt	42.07	44.80
t	44.45	44.45

important to distribute and merchandise the product effectively for producers to be adequately rewarded. In addition, production decisions must be coordinated with processing and distribution decisions if producers are going to maximize their net returns.

Target Markets

A single firm may have one or more target markets such as major chainstore retailers, local food retailers, specialty meat shops, and food service firms (hotels, restaurants, institutions, airlines, etc.). A large processing firm (500,000 or more head annually) has to aim at a large market segment such as national food retailers and food service purveyors. Moderate size firms could look to regional chainstores and purveyors, and small firms (50,000 or less head annually) could serve local retail food stores and specialty meat shops. The cooperative should be careful not to become dependent on any single large account that could be altered or canceled on short notice.

Product Form

The product may be sold as fresh whole carcasses, fresh or frozen primal cuts, frozen retail cuts, or frozen portions. The form will depend on the target market(s) chosen. Many retail food stores still prefer to buy fresh carcasses. Some are beginning to purchase fresh primals. Other retailers may buy primals in the future if various traditions and objections such as those of local butchers' unions can be overcome. The low volume of lamb handled by many retailers would make frozen retail cuts well suited to this market, but most retailers believe the consumer will not accept frozen cuts. Hence, its widespread use is probably several years away. On the other hand, food service firms find frozen primals and portions require a minimum of kitchen preparation, and are quickly implementing the new technology.

Method of Distribution

A new cooperative lamb processor may hire its own salesforce or sell through brokers on commission. If the cooperative takes over an existing processor, it would probably keep most of the established salesforce and their market contacts. Most existing processors have their own salesforce. A new firm, however, might find it advantageous to contract with an established sales organization. This organization may only be in the brokerage business, it may be another lamb processor that wants to expand its sales, or it may be a processor of other commodities that wants to expand its product line.

Several cooperative processors may be agreeable to expanding their product line as a means of increasing their volume per salesman. Some of these cooperatives sell beef and pork to retailers and might like to add a lamb line. Others sell poultry or other products to which a lamb line could be added.

The decisions on target market(s) and form(s) of the lamb product may have to be decided in conjunction with the firm that acts as broker for the lamb processing cooperative. A cooperative beef and pork processor would probably prefer a fresh carcass or primal product for retail sales, whereas a poultry processor might insist on fresh or frozen retail packages to fit into their distribution system. A processor or broker that sells primarily food service firms rather than retail stores might insist on frozen portion controlled products.

Brand

In conjunction with the other decisions just discussed, the cooperative lamb processor must decide whether to brand its lamb products and how to promote that brand.

Fresh carcasses and primals offer little opportunity for branding because the retailer does the packaging. A cooperative that does its own retail or portion packaging has more opportunity for branding its product. The brand may be unique to the lamb cooperative, or the cooperative may adopt the brand of the firm accepted as broker of its products.

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